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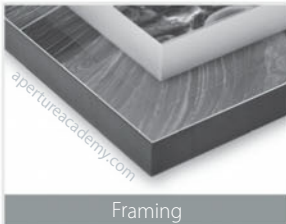
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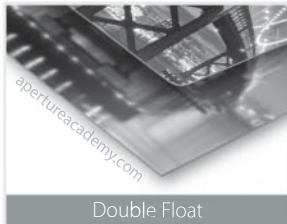
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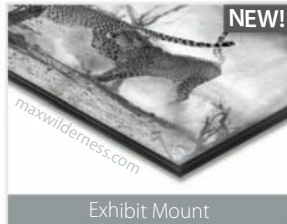


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LEE Big Stopper, LEE 0.9 ND Soft Grad
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LEE Big Stopper, LEE 0.9 ND Hard Grad
Nikon D3X, Zeiss 28mm Distagon, 30 sec @ f/11



LEE Big Stopper, LEE 0.9 ND Soft Grad
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LEE Big Stopper, LEE 0.9 ND Soft Grad
Nikon D800E, Zeiss 28mm Distagon, 106 sec @ f/11

LEE FILTERS BIG STOPPER

In my work I try to achieve space and simplicity by transforming the locations I choose into elemental shapes and forms. To achieve this in-camera I mostly work in the early morning light, using long shutter speeds to transform seas and skies into surreal, ethereal forms, which then by default lend space to the composition and draws attention the subject.

Filters are an important part of the process too, and I choose to use the LEE Big Stopper to give me the very long shutter speeds I require. Unlike screw-on filters the Big Stopper lets you recompose and check focus in seconds. As part of the LEE Filter system one can also use the Big Stopper with LEE ND grads easily and painlessly, which, when you're working in interperate conditions, is a real bonus. Wherever I travel, whether it be Greenland, China or Tanzania, the LEE Filter system is always in my camera bag.

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Jonathan Chritchley
www.jonathanchritchley.net



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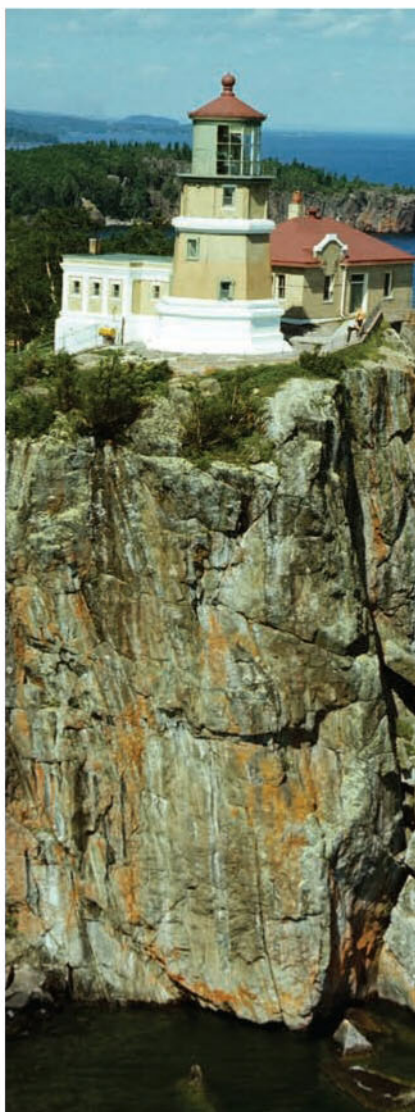
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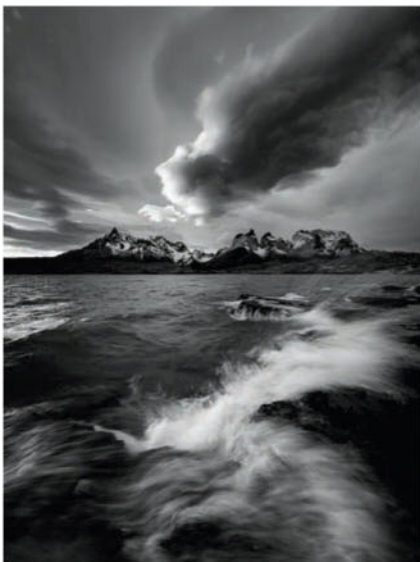
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Photographer: Ian Plant

Location: Torres del Paine National Park, Patagonia, Chile

Equipment: Canon EOS 5D Mark III, Canon EF 11-24mm f/4L USM lens and tripod

Situation: Torres del Paine National Park in Chile has become one of the most popular destinations for landscape photographers looking for rugged, pristine vistas. Ian Plant was there in April of 2015, and the photograph on the cover of this issue of *Outdoor Photographer* is one of his favorite images from that trip.

"One evening in Torres del Paine," he writes, "we photographed a stunning display of storm clouds at sunset. I used an ultra-wide angle of view with Canon's new 11-24mm lens to simultaneously capture this incredible sky with lots of foreground. I took many photos as waves crashed against the shore, waiting for the perfect wave to complement the overall composition."

Plant continues, "The mountains of Patagonia are easily among the most beautiful in the world, and every landscape photographer should have this region on his or her personal bucket list."

Plant runs Patagonia photo tours, as well as tours and workshops to other domestic and international locations, through his company, Epic Destinations. In addition to being a frequent contributor to *Outdoor Photographer*, Plant is a Tamron Image Master. Be sure to check out his article "Do More With Wide Angle" in this issue for his top-five tips for making special wide-angle images, and see more of his photography on his website at www.ianplant.com.



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Gary Wagner

For some, making a black-and-white image is as easy as tapping on an Instagram filter in a smartphone. For others, it's taking a high-resolution file from a DSLR and making use of Nik Silver Efex Pro. Regardless of how it's done, the one thing that's certain is that black-and-white photography is in the midst of an ongoing renaissance thanks to digital technology.

When I joined *OP* some 19 years ago, photography was on the verge of a massive transformation. The long-anticipated emergence of consumer digital cameras was in the air, and people were starting to talk about the potential of a new piece of software called Photoshop. At the time, I still shot film pretty much exclusively, mostly Fujichrome Velvia and Kodak TRI-X.

This magazine was inspired by photographers who shot transparencies. Kodachrome was king, and the generation of nature shooters who chose 35mm SLRs as their tools of choice had broken from the large-format cameras and black-and-white printmaking of the mid-20th century. It was a generation best personified by the expression “f/8 and be there!” Don’t worry about having the camera setting exactly perfect, just get to the right place at the right time and get the shot! Also, a by-product of shooting color transparency film was that it didn’t make the darkroom unnecessary as much as it made it obsolete.

Processing color film and making a color print from a negative or a transparency with an enlarger is an order of magnitude more difficult than the relatively simple steps of working with black-and-white film and chemistry. Therefore, the entire hands-on process of making a picture was in the moment when you depressed the shutter button. After that, a lab was given charge of the roll of film, and a day or so later, you’d pick up a box of color transparencies.

On the other hand, with a black-and-white image, the process of making the picture really

just begins when you depress the shutter button. Sure, you could drop off the film at a lab and come back for an envelope of prints and a stack of negatives, but enthusiasts like us didn’t take that route. We’d have dedicated spaces in our homes, where, in total darkness, we’d carefully work the film through the developer, stop bath, fixer and a final rinse. After drying the film, we could embark on the steps of making the print with the enlarger and photo paper.

For many photographers, the lengthy processes of making black-and-white photos weren’t interesting, and when I started here, some on the staff really considered black-and-white, in general, to be just plain boring.

Fast-forward to today. Digital has taken over photography and a new generation has embraced black-and-white. For some, making a black-and-white image is as easy as tapping on an Instagram filter in a smartphone. For others, it’s taking a high-resolution file from a DSLR and making use of Nik Silver Efex Pro. Regardless of how it’s done, the one thing that’s certain is that black-and-white photography is in the midst of an ongoing renaissance thanks to digital technology. Some photographers have been so inspired that they’re actually going full-retro and experimenting with wet-plate materials.

I look forward to producing this **Special Black & White** issue of *OP* every year. I hope it inspires you to get out and see the world a little differently, especially if you’ve been thinking that black-and-white is really just for the kids messing around with Instagram.

—Christopher Robinson, Publisher/Editor



SHOW CASE

El Capitan Meadow

With an early winter storm coming in, Robin Black saw that conditions in Yosemite Valley were going to be changing fast. "The storm was bringing beautiful atmospherics with it," she writes. "I took the highway out of the valley that ascends high up the north side of the Merced River Canyon so I could shoot back at Bridalveil Fall. As I waited for the mist to clear slightly in the distance and un-obscure Bridalveil, I looked across the canyon and noticed the mist swirling around a rock formation popular with climbers called the Rostrum. Under clear conditions, the formation isn't an imposing standout like some of the better-known granite features in Yosemite Valley, but when highlighted in this way, it suddenly looked incredible. It has never looked the way it did on this morning. Since the photo shows mostly granite, the colors here were so subtle as to be almost invisible. I decided to take this monochrome feel further and process it as a black-and-white image in Lightroom."

Canon EOS 5D Mark II, Canon EF 70-200mm f/4L



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SHOWCASE

Chasing The Sun

Klaus Priebe took this shot on a trip to White Sands, New Mexico. The image is our Taken With Tamron May Landscape winner. He writes, "I walked the dunes following the sun and found these two little bushes growing out of the sands, with thousands of tiny little beetle footprints in every direction. It was just too cool, so I patiently waited about 45 minutes for the clouds to move and let the sun light up the scene a bit. It almost looked as if the clouds weren't going to clear, but when they eventually did, it was 10 minutes of sheer bliss. When the sun finally lit up the dunes, it appeared as if the bushes along with all the little critters were chasing the sun. I could just visualize them heading toward the sun and catching the sunset. The light glancing along the dune ridges really made for a visual treat. I could see the small grains of gypsum sparkle in the sunlight, and all the wonderful textures of the dunes and tracks coming out as the light skimmed the dunes."

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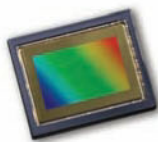
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SHOWCASE

Clouds And Sea

Gary Wagner brings a darkroom sensibility to his digital work. He explains, "I was out to become a black-and-white digital photographer and wanted to learn everything that I possibly could on how these techniques work and how I can create the best-quality black-and-white images with the greatest latitude for my own interpretation. I became so excited about digital and not only taking the images, but making the images. It's a complete process. When I worked with black-and-white film, I initially used the Zone System. I went on to Beyond the Zone System and sensitometry, and I spent years perfecting techniques and charts and graphs and tests and things like that." Images like this show Wagner's mastery of black-and-white exposure and image-making. For more, see the article "Interpreting The Landscape" in this issue of *OP*.

Nikon D800E

Gary Wagner



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◀ SONY a7R II

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PORTABLE LUMIE LED ▶

Manfrotto has released the **LUMIE LED** line as a light and portable option suitable for travel photography. The **LUMIE Play** is the smallest in the range. It can be carried in a pocket and easily pulled out for macro photography. The mid-sized **LUMIE Art** is constructed from aluminum for durability. The **LUMIE Muse** is the largest light in the series, measuring the size of a deck of cards and providing 4-step dimming. All LUMIE LED lights are a continuous light source with a round catchlight, perfect for both still photos and video shooting. The Li-ion batteries are easily recharged by a standard microUSB port. Each LUMIE LED kit comes with a snap-fit filter mount and several color and diffusion filters, with additional filter kits available separately. A **LUMIE ballhead** is designed for 360° pans and 35° tilts. The **LUMIE tripod mount** attaches the light to the camera hot-shoe mount or a standard tripod using the 1/4-inch adapter. List Price: \$11-\$119. **Contact:** Manfrotto, www.manfrotto.us.



◀ LEICA FULL-FRAME COMPACT

Leica's new **Q (Typ 116)** combines a full-frame, 24.2-megapixel CMOS sensor matched to a fast 28mm *f*/1.7 Summilux lens in a compact magnesium and aluminum body to create a take-it-anywhere camera capable of delivering excellent images. Additional features include a high-res, 3.68-megapixel eye-level EVF complemented by a touch-screen external monitor, optical image stabilization, a Leica Maestro II processor that allows for 10 fps shooting at full resolution and ISO settings from 100-50,000, 1080 video at 60p and 30p, plus 720/30p, and built-in Wi-Fi for easy file sharing and remote camera operation. With a clean, functional design and very quick AF, the Q is a bit larger than Sony's RX1 cameras at 5.2x3.1x3.7 inches and 20.8 ounces, but features a wider, faster lens, and has a built-in EVF. Estimated Street Price: \$4,250. **Contact:** Leica, www.leica-camera.com.

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OLYMPUS PRO SUPERWIDES ▶

Olympus has expanded their **PRO** series of lenses for Micro Four Thirds System mirrorless cameras with the **M.Zuiko Digital 7-14mm f/2.8 PRO superwide zoom** and **M.Zuiko Digital 8mm f/1.8 PRO 180° full-frame fisheye**. Both feature weather sealing, Olympus' ZERO coating and lots of exotic elements to counter chromatic aberrations. The 7-14mm (equivalent to 14-28mm on a full-frame DSLR) can focus down to 7.8 inches and has an L-Fn button with 27 assignable functions. The 8mm is the fastest fisheye around and can focus down to a working distance of about one inch from the front element. Both lenses are compact, the 7-14mm measuring 3.1x4.2 inches and weighing 18.8 ounces, and the fisheye, 2.4x3.1 inches and 11.1 ounces. Estimated Street Price: \$1,299 (7-14mm); \$999 (8mm). **Contact:** Olympus, www.getolympus.com.



◀ DIGITAL HIGH-GRADE ND FILTERS

Marumi has added several new lens filters to their line. The most popular **DHG (Digital High Grade)** range now includes ND filters with 8, 16, 32 and 64 filter densities for 37mm up to 82mm thread sizes. Marumi has also expanded their **DHG Variable ND2-ND400 range** (for 49mm-82mm sizes), adding Variable ND2.5-ND500 filters in 58mm and 77mm sizes. All filters are made in Japan with a low-reflectance coating on both the front and rear sides of the filter. The DHG filters also feature ultrathin frames, which allow for use on wide-angle lenses without vignetting. List Price: Varies. **Contact:** Argraph, www.argraph.com.

NEW CANON "NORMAL" LENS ▶

Canon has brought its STM stepping motor technology to the normal lens, with the **EF 50mm f/1.8 STM**. The new lens ("normal" on a full-frame EOS DSLR, 80mm-equivalent portrait telephoto on an APS-C EOS DSLR) features a fast f/1.8 maximum aperture, which can produce beautifully blurred portrait backgrounds and is handy for low-light work. The lens supports Canon's EOS Movie Servo AF function (with compatible cameras) for smooth and quiet AF; it can focus as close as 14 inches (0.21X magnification). Dimensions of 2.7x1.5 inches and 5.7 ounces make it the lightest EF 50mm lens ever, and the list price of \$125 makes it eminently affordable. **Contact:** Canon, www.usa.canon.com.





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◀ NIKON 1 J5

The **Nikon 1 J5** is the newest addition to the Nikon 1 interchangeable-lens system. The camera uses a 20.8-megapixel BSI CMOS sensor with EXPEED 5A image processor. The Hybrid AF utilizes 171 Contrast-Detect points and 105 Phase-Detect points to capture quick-moving subjects at 20 fps with AF. The 160-12,800 ISO captures low-light images. The J5 shoots 1080 HD video at 60p. The 180° tilt touch-screen makes it easy to shoot at unusual angles, and the built-in WiFi and NFC connection provides quick sharing and remote control use. Available in Silver, Black and White. List Price: \$499 (Nikon 1 J5 with 1 Nikkor VR 10-30mm f/3.5-5.6 PD-Zoom); \$1,049 (Nikon 1 J5 with 1 Nikkor VR 10-100mm f/4-5.6). **Contact:** Nikon, www.nikonusa.com.

VELVET 56 ▶

The **Velvet 56** from **Lensbaby** is a 56mm f/1.6 lens for SLR and mirrorless cameras that offers a versatile and creative approach to images. With a 1:2 macro capability, the lens provides a velvety, ethereal glow when used at wide apertures and a sharp, yet smooth look when completely stopped down. This look was created specifically with mid-20th century manual-focus lenses in mind. The all-metal body is available in black or a special Velvet SE silver edition. SLR lenses are available for Canon, Nikon, Sony A and Pentax cameras, and mirrorless mounts are available for Micro 4/3rds, Sony E, Samsung NX and Fuji X cameras. List Price: \$499 (Velvet 56); \$599 (Velvet SE). **Contact:** Lensbaby, www.lensbaby.com.



◀ HIGH-CAPACITY JETFLASH DRIVES

With durability, portability, high capacity and high-transfer speed in mind, **Transcend** has introduced a line of 256/128 GB USB 3.0 flash drives. The **JetFlash 780** offers 256 GB of storage for up to 120,000 images or 64 hours of full HD video, with a transfer speed of 210 MB/s. The **JetFlash 810** meets U.S. military drop-test standards for resistance to shock, moisture and dust, and is available in five colors that are highly visible outdoors. The **JetFlash 700/730** features a classic gloss-white and piano-black style aesthetic, and the **JetFlash 790K/790W** offers compact and easy storage in capless and retractable profiles. List Price: Varies. **Contact:** Transcend Information Inc., www.transcend-info.com.

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KIPON + ADORAMA ▶

Adorama is now the exclusive U.S. outlet for all KIPON products. KIPON creates over 400 varieties of camera lens adapters, including macro adapters, electronic adapters, tilt/shift adapters and optical focal reduction adapters for Canon, Nikon, Sony, Olympus, Leica and other cameras. Adorama will be honoring the KIPON 12-month manufacturing warranty for all products purchased in-store and online. **Contact:** Adorama, www.adorama.com.



◀ IR FILTER SERIES

Designed specifically for long-exposure photography, the **Tiffen 10-stop XLE Series Filter Line** dissipates IR wavelengths that create pollution in long-exposure images. The **APEX filter** utilizes a standard near-IR blocker and Tiffen Hot Mirror for premier IR absorption and is compatible with all DSLR, APS-C and Micro 4/3rds sensors. The **ADVANTIX filter** offers basic IR absorption with an active IR-absorbing element, creating a slight greenish color cast that can be adjusted through the manual camera settings. It has been designed for DSLR Color and B&W modes, as well as APS-C sensors when using IR photography-approved lenses. The **AXENT filter** has no IR absorption and instead promotes IR wavelengths. Ideally used with full-frame DSLRs in B&W mode and the Fuji X-Trans APS-C camera, the filter creates a stylized IR color effect and warm hue. All filters are available in focal lengths from 40.5mm to 82mm. List Price: \$170-\$366 (APEX); \$70-\$266 (ADVANTIX); \$37-\$98 (AXENT). **Contact:** Tiffen, www.tiffen.com/xleseries.



WATERPROOF TRIPOD ▶

The **W Series waterproof tripods** by **SIRUI** have been designed for ease of use while working around water. The WPS Waterproof Sealing System has borrowed materials from the automotive industry to create waterproof rings to prevent water and sand from entering the tripod leg tubes and locks. The legs have three leg angle positions for use with uneven terrain, with locks that push open and stay open until you select the precise position for ease with wet or gloved hands. The rubber feet of each leg can be replaced with stainless-steel spikes. The W-2204 extends to 70.9 inches and holds up to 39.7 pounds. The legs invert 180° to fold down to 20.5 inches for transport. The center column provides a hook for a weight bag, and one of the legs can be converted to a waterproof monopod. Estimated Street Price: \$534. **Contact:** Argraph, www.argraph.com.





SPEEDY LEXAR USB 3.0 FLASH DRIVES

Lexar has introduced the new **JumpDrive line of USB 3.0 flash drives**. The **JumpDrive P20** can read at up to 400 MB/s and write at up to 270 MB/s, and the **JumpDrive S25, S35, S55 and S75** can read at up to 150 MB/s and write at up to 60 MB/s. EncryptStick Lite software helps protect files against corruption, loss and deletion. The P20 is available in 32 GB, 64 GB and 128 GB capacities, and the S55 in 128 GB. The S75, S35 and S25 are available in colors, as well: purple (16 GB), orange (32 GB), green (64 GB), black (128 GB) and white (S75 only, 256 GB). List Prices: \$17-\$136.

Contact: Lexar, www.lexar.com.

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POLARPRO GOPRO CARRYING CASES ▶

Users of GoPro action cams will like the **PolarPro PowerVault travel case**. It features an embedded 5200 mAh battery that can recharge a camera battery up to six times in the field through dual charging slots, plus a USB slot that can provide direct power to any standard USB device. Two custom-fitted slots can house two GoPro HERO3/3+ or HERO4 cameras, and the case provides storage space for cords, housings and other accessories. If you don't need the recharging capability, PolarPro offers new Trekker Single and Double cases, which accommodate one and two GoPros in their housings, respectively. All feature water-resistant ballistic nylon exterior shells and protective foam inserts. Estimated Street Price: \$99 (PowerVault); \$29 (Trekker 1); \$49 (Trekker 2). **Contact:** PolarPro, www.polarprofilters.com.

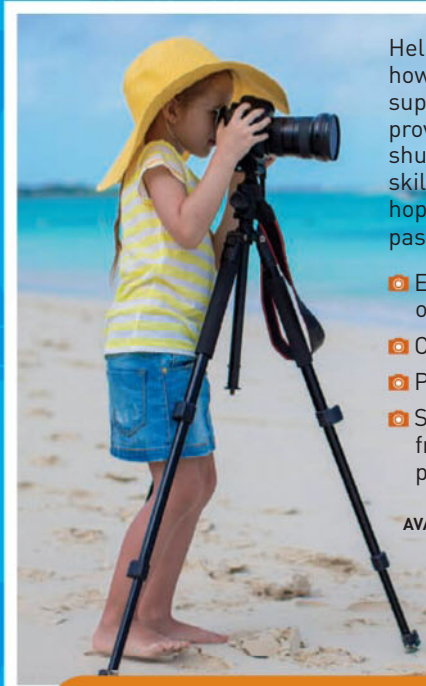


◀ THE AGUA

Miggo, the company behind the Grip & Wrap camera-carrying solution, is back with a new Kickstarter campaign for their IPX3 storm-proof camera case called **The Agua**. IPX3 storm-proofing protects the camera from water spray up to 60° at 2.6 gallons/minute for 5 minutes at a pressure of 80-100kN/m². The Agua is designed specifically to enable "quick-draw" for your camera so you don't miss a shot and includes a quick-release buckle that connects to your camera to protect from slips due to wet hands. The Agua bag strap quickly disconnects from the bag to be utilized as a stand-alone camera strap without the carrier. Available in three sizes, The Agua is now available for pre-order. List Price: \$55-\$65. **Contact:** Miggo, www.mymiggo.com.

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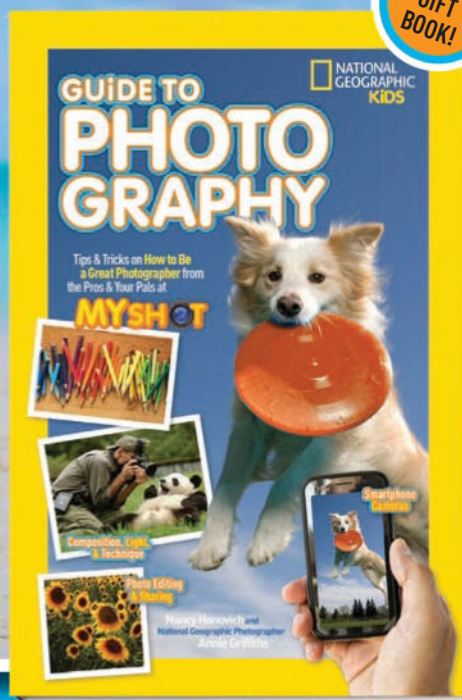
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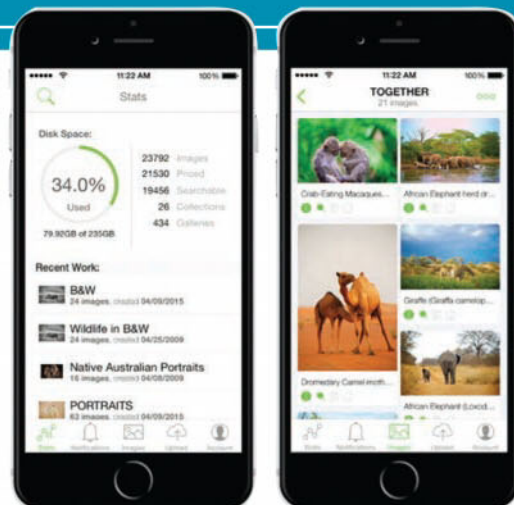


KIDS: Join the National Geographic Kids photo community at: kids-myspot.nationalgeographic.com



PHOTOSHELTER MOBILE APP ▶

PhotoShelter's new **Mobile App** lets PhotoShelter members take care of photo business, wherever they are. Using the app and your iOS device (an Android version is in the works), you can search and view your images, respond to client requests for images, price images for sale, get notified immediately when clients download images or you make a sale, manage permissions and access to your work, upload images directly from your iPhone's camera roll, post images from your archive to social media, and view basic account statistics. The app is free to PhotoShelter members at the Apple App Store. **Contact:** PhotoShelter, www.photoshelter.com.



◀ VINTAGE FILM ARCHIVE

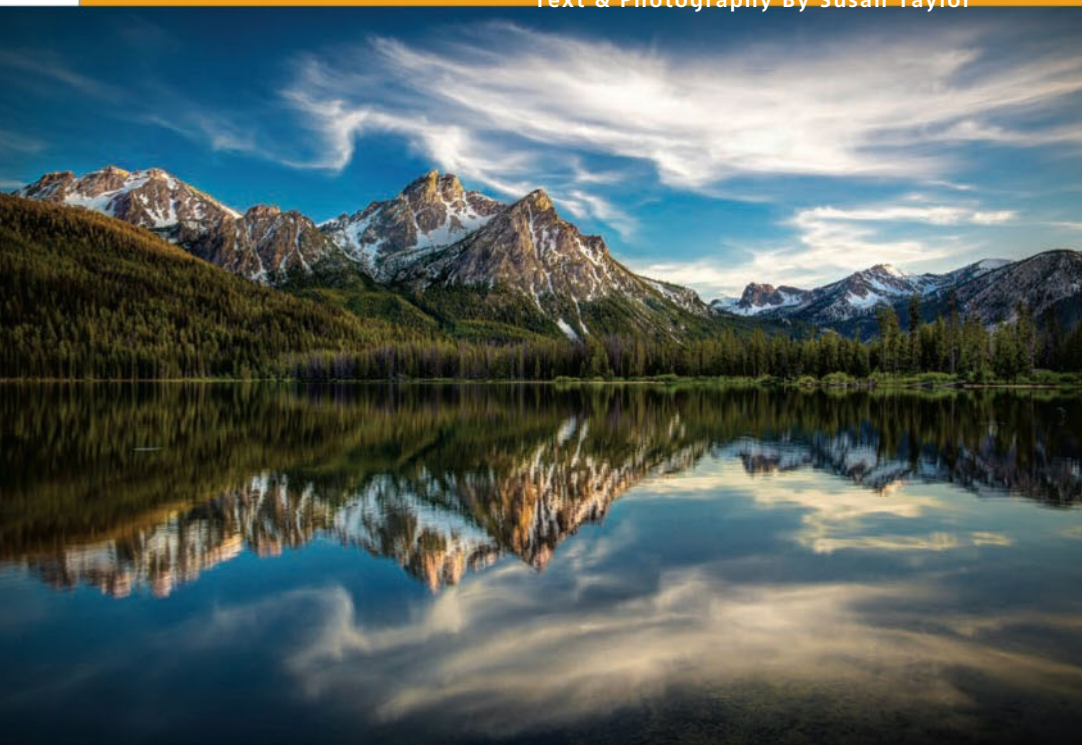
With Replichrome I: Icon and Replichrome II: Slide, **Totally Rad! Inc.** has created an archive of modern and semi-available film presets for application with digital images. Now the company has developed **Replichrome III: Archive**, presenting a collection of presets emulating the looks of rare, expired, outdated and discontinued films from Agfa, Kodak and Konica. The 22 different films and 183 presets are available with custom camera profiles for over 400 camera models and can be used with Adobe Lightroom and Camera Raw. The program also includes a preset toolkit so you can customize each vintage look. List Price: \$99. **Contact:** Totally Rad! Inc., www.gettotallyrad.com/replichrome.



MIKE BRINER ON B+W F-PRO POLARIZER

"I was in my Jeep tooling around Lead King Basin in Marble, Colorado when the image inspired me. The majestic peaks horned the valley, newly ablaze with fiery spring wildflowers. To capture the Reflex Blue sky, cotton puff clouds and countless reflective patches of melting snow dotting the panorama, I reached for my Canon camera. On front of the 24-105mm lens, my B+W F-Pro Polarizer ensured me the image was calendar perfect."





McGown while reflecting onto clear-blue Stanley Lake. I recommend bringing a quality wide-angle landscape lens and polarizer, with a sturdy tripod and head, a wide-angle 16-35mm *f*/2.8, 24-70mm *f*/2.8 and 70-200mm *f*/2.8 telephoto with image stabilization for distance and macro shots. With the stabilizer built into the lens, you may be able to shoot handheld; otherwise, a tripod works best. You may get lucky and spot a bear or fox in this remote area and will be glad you had a nice sharp telephoto zoom. A full-frame-sensor DSLR is a great choice because it allows you to capture more light, with nice details and dynamic range.

Best Times

My favorite time to visit Stanley Lake is early summer, with temperatures averaging a high of 78° F and a low of 30° F. Early autumn is also a special time to view the warm, vibrant fall colors and breathe in the crisp, clean air, with invigorating cool temperatures. **OP**

Contact: Sawtooth National Forest, fs.usda.gov/sawtooth. You can see more of Susan Taylor's photography at www.susantaylorphoto.com.

Essential Gear...



When shooting landscapes with a wide-angle zoom lens, a thin-ring polarizer is your best bet to help reduce glare and reflections, and increase saturation of skies and foliage. **B+W's Slim-Line Mount Circular Polarizers** offer reduced vignetting due to the lack of a front accessory thread. The Multi-Resistant Coating (MRC) is water- and dirt-repellent, and protects the filters from scratches. **Contact:** B+W, www.schneideroptics.com.

STANLEY LAKE,

Sawtooth National Forest, Idaho

Location

Stanley Lake, and the spectacular jagged snowcapped peaks and pristine forests of the Sawtooth Mountain Range, are located within the Sawtooth National Recreation Area in central Idaho, only 30 minutes from the charming little town of Stanley. To get there from Stanley, go five miles north on ID 21, then 3.5 miles west on Forest Road 455. The lake is tucked in nicely just below the foot of Mount McGown. Stanley Lake Campground is situated on a hillside above the lake in a thick grove of lodgepole pines, with fantastic views of 9,860-foot McGown Peak and all of Stanley Lake. Check out the 4-wheel-drive roads or the Idaho Centennial Trail so



you can explore even more mesmerizing views, as well as some eye-popping sunrises and sunsets.

Weather

Snow can linger into early or mid-May, and the first snowstorms often begin in mid-September. During a summer day, 70s are common, but nighttime temperatures can quickly drop into the 30s on cloudless nights. Check the weather at the ranger station or use a weather app before planning your photography adventure. I recommend having full rain gear, as unexpected thunderstorms aren't uncommon. Weather patterns in Sawtooth can change frequently and without warning. Four-wheel-drive is recommended because there are areas nearby that can remain flooded from snowmelt up to three-plus-feet

deep. Weather can be challenging and may be too severe to venture during the winter.

Photo Experience

It was awesome to be able to camp right along the shoreline and watch the light and weather change from dawn to dusk while the bald eagles flew by and fished when the trout were active. There weren't many clouds the first two days I visited Stanley Lake, so I spent a lot of time scouting the shoreline and hillsides for interesting compositions that I could find useful later on when there was better light and intriguing clouds. The harsh light and glare from the bright sun made shooting conditions difficult and uninteresting, even with a polarizer and neutral-density filter. My best capture was on the third morning, when some soft, wispy clouds swirled around the peaks of Mount

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Born in Finland, I now live in Taipei, Taiwan, and even though diving is very nice here, there are no longer sharks around, as they have been fished out for shark fin soup. Environmental protection of seas isn't sufficient yet, but it's good to see that the popularity of shark soup is going down due to active campaigning in China, Hong Kong and Taiwan. I hope that the slowing market will give change, to see sharks here in the future, but in the meantime, I have to travel elsewhere to photograph them.

Last November, I took a one-week live-aboard trip to the Red Sea in Egypt. We started from Marsa Alam and headed first to the Brothers Islands, where this photo was taken. Oceanic whitetip sharks were one of the main subjects we were hoping to see, so it was planned to stay two days there diving with them. That time of year, they're often close to the reefs on these islands, which are actually just rocks over the surface in the middle of the open ocean.

Jacques Cousteau described the oceanic whitetip as "the most dangerous of all sharks." There are no records of them attacking divers, but they're very curious, mainly checking to see if there's something they could eat.

The routine was the same for every dive. We dove directly from the boat and headed for the reef. The sharks would hear that something was in the water and after awhile they would come check us out. Then we would wait for them in the very deep, open blue water fairly close to the ship, but staying at a depth of just five meters. Every dive we saw them, sometimes farther away, but often they would make a pass just one meter from us. It felt very calm, and I just loved being out there with those amazing animals in their natural environment. They moved very gracefully, but it seemed they have learned to be a bit wary of humans.

Taking good photos underwater is very difficult. Of course, you need an underwater housing for your camera—in my case, it's just a normal full-frame DSLR. Even in relatively shallow water, you need to bring

light with you (dual underwater strobes) in order to show the real colors. The problem is that strobes light all the small particles in water, so the position and power of the strobes need to be carefully adjusted.

I like that when non-divers see the photos they think about how they could protect the waters. Usually, what you don't see, you don't care about. The last few decades have been very bad for the seas, and it will



SWIMMING

The Brothers Islands, Red Sea, Egypt



WITH SHARKS

impact all of us more than we know. Showing animals like sharks in their own environment hopefully will make some people think about how they can help to protect these beautiful animals.

OP

To see more of **Tommi Kokkola's** photography, visit his website, www.tommikokkolaphotography.com. Follow him on Facebook at

www.facebook.com/tommikokkola photography, on Instagram at [instagram.com/tommikokkola](https://www.instagram.com/tommikokkola) photography and on 500px at [500px.com/tommikokkola](https://www.500px.com/tommikokkola).

ASSIGNMENTS

►► Winning Images From The Weekly Assignments At outdoorphotographer.com



1

For this special Black & White issue of *OP*, we're highlighting several standout images from the recent Shades Of Gray Assignment at outdoorphotographer.com.

Congratulations to Harry Lichtman David Bodine and Michael Ryan for their winning images. In addition to the *OP* website, you can keep up with the latest Assignments on our Facebook page, [facebook.com/outdoorphotographer](https://www.facebook.com/outdoorphotographer).

1) PHOTOGRAPHER: HARRY LICHTMAN

EQUIPMENT: Canon EOS 5D Mark II, Canon EF 100-400mm f/4.5-5.6L IS, Manfrotto tripod, Really Right Stuff ballhead

This image was taken in March 2013 during a trip to Argentina's Los Glaciares National Park at the southern tip of South America. While in Patagonia, I was hoping to capture an image that illustrated the epic winds the region is known for. A wind and sleet storm had blown in over the town of El Chaltén during my last day in the park. Since the winds were so strong and visibility was so poor near the mountain, I figured I might have better chances of a clear view by moving away from the mountains. The intense and steady winds made it difficult to get sharp images, so I made plenty of exposures as insurance. I positioned myself prone on the ground and left the IS engaged even though the body was on a tripod—normally not recommended. Wearing swim goggles prevented my eyes from tearing up due to the wind and dust, and allowed me to focus using Live View for the sharpest images possible using a long zoom lens. I felt fortunate I was able to capture the power and magic of this iconic landscape.

Postprocessing was very straightforward. The color original was converted to black-and-white in Photoshop. I increased the contrast selectively in the cloud areas to help reveal the detail and texture, and gave the image the ever slightest blue tint to remove the warmth from the original black-and-white conversion.



2) PHOTOGRAPHER: DAVID BODINE

EQUIPMENT: Canon EOS 5D Mark II, Canon EF 16-35mm *f*/2.8L II, Really Right Stuff tripod, BH-55 ballhead, LEE 6-stop ND filter, Click Elite camera backpack

Late Fall 2012, I headed up the trail to Fern Falls in Rocky Mountain National Park, Colorado. It was late fall and the color was coming on. When I arrived, I realized this waterfall was far too low in the canyon for the sun to set anywhere near it. No matter—fresh air, beautiful weather—my spirits were high. Photography teaches me that patience is the key. The stream leading up to the falls led me alongside her now and then—sometimes away where I could only faintly hear her, then back through dark timber and small clearings. I decided to go off-trail to see if I could find a few spots to shoot that weren't often visited. There were some beautiful spots, but the water just wasn't flowing. In June 2013, I headed back up for the peak time for snow runoff. I found my spot and set up with one leg of my tripod in the flowing water. This was taken about 20 minutes after sunset. I wanted really soft water, so I shot this image in HDR with a LEE 6-stop ND filter. When I was finishing up and taking my ND filter off, I dropped it, and it was washed away. The image was postprocessed in Photoshop CS6 through Nik Silver Efex Pro 2.

3) PHOTOGRAPHER: MICHAEL RYAN

EQUIPMENT: Nikon D800, AF-S Nikkor 80-400mm *f*/4.5-5.6G ED, HOYA 6-stop ND filter

After several years of living in the San Francisco Bay area, I've grown to love the ever-present coastal fog that often dominates the landscape. When photographing fog in the Bay area, the Golden Gate Bridge is often the first shooting location chosen by many, but I prefer the beautiful hills of Marin County that lie farther north.

On this evening in May 2015, local webcams gave me the inspiration to make a last-minute trip to Mount Tamalpais State Park in hopes of catching fog streaming over the western slopes. Summer is the best time to capture this type of scene, and my efforts were rewarded with beautiful conditions as sunset approached. In the past, I've focused on capturing the wider view, but this time I decided to use my 80-400mm zoom to pick out smaller scenes within the larger scene. Just like with moving water, an ND filter allowed me to extend my exposure, softening the appearance of the moving fog.

I processed the RAW file in Adobe Camera Raw and converted the image to black-and-white using Silver Efex Pro 2. Final adjustments were limited to minor cloning in the bottom left and right to remove very small intruding treetops.



S

Shooting black-and-white photography can be a confusing style to navigate. From fully automated cameras that can measure exposure from 51 source points, to phone apps that offer up a huge number of filters and functions, not to mention postproduction programs like Lightroom, Photoshop and Google's Nik Collection, it's easy to get lost in the mix and forget what got you excited about shooting in the first place. I've broken down my architecture for shooting black-and-white photography into what I hope is an easily digestible process. Inherently, what I propose is nothing new or earth-shattering, but it's a stepped system I follow to capture each moment with my mind in black-and-white.

1) THINK-ing In Black-And-White

When I talk about *thinking* in black-and-white, I'm speaking about the ability to have a conscious mind, being present in the moment. I think about black-and-white photography as the art of translation (what you see is what you get), and it's in this *thinking* where I establish my visual language, setting in motion the shot I want to capture.

When you first learn to think and see in black-and-white, comprehending the process of translating a full color scene into black-and-white is critical. There are several key visual elements to look for in your scene or subject: light and shadows, followed by contrast and texture, and, finally, tonality.

For instance, with the landscape scene of Zabriskie Point in Death Valley National Park, the light and shadows of the clouds were creating an interesting layering with the sky. Conversely, the land in the foreground was in relatively flat, low-contrast light, while the colors were all falling into the same red to brown hue.

When I was looking at the landscape, fortunately, I saw a nice variety of texture and variation of tones from light to dark. When viewing the overall scene, the one visual component the image benefits from most is its contrast.



Think,

Jack Curran's three-step process



Feel, Do

for shooting strong black-and-white images

TEXT & PHOTOGRAPHY BY JACK CURRAN

A low-contrast scene will hold more detail than in a high-contrast scene where the highlights and shadows are pushing the extremes. By increasing the contrast, the overall tonality of the scene emerges. As seen in the photograph made of the dunes and clouds in Great Sand Dunes National Park & Preserve, a moderately high-contrast scene that has soft, but distinct variation between shadow and light is inherently perfect to be translated into a very dynamic and powerful image.

2) FEEL-ing In Black-And-White

Once you have an understanding of how to translate the *thinking* (what your eyes see), it's time to go to Step Two. To create and ultimately construct meaningful black-and-white photography, you have to establish a strong personal connection to your subject. This step is paramount. It shows your creativity and personality and, most important, it's where you bridge the gap between what you see and how you feel it. This creative process is characterized by your originality of thought and imagination.

When thinking about creativity in the context of photography, I immediately think about photographs that move beyond mere documentary images and ones that transcend into something truly meaningful and personal. I find that imagination is the *most* important factor. So, how do I visually activate my imagination? How do I connect with my subject? Passion—that visceral gut feeling that drives us to do the things we love!

When combining imagination with passion, a connective tissue is formed that helps us learn the difference between taking ordinary documentary images and creating significant photographs that evoke emotions. So focus on subjects you're passionate about!

3) DO-ing In Black-And-White

Now that we're thinking and seeing a subject with a new set of eyes, and have discovered the happy medium where imagination meets passion, it's time for the third step. Get out there and do something with it! Yes, it's that simple. To actually discover the realm of possibilities with black-and-white photography, we have to go outside our comfort zones and explore the opportunities. Shoot with what stirs your curiosity. Shoot with the passions that drive your heart. **JUST SHOOT IT!**



OPENING SPREAD: Jack Curran's process for creating strong black-and-white landscape images is divided into a step-by-step plan. Many photographers tend to "mess around" with black-and-white after taking photos when they can experiment in the computer. Curran shows how a more thoughtful process that begins before the camera is brought to the eye can yield more successful results. *Zabriskie Point, Death Valley National Park, California, shown large in black-and-white and as a color inset.* **ABOVE:** Bald Cypress. Smooth tonality and striking graphics make this image perfect for monochrome treatment.

OPPOSITE PAGE: These two photographs from Great Sand Dunes National Park & Preserve in Colorado show how much more evocative a black-and-white image can be. Note the way the black sky—created through red filtration, which can be done in-camera or sometimes in the computer—adds to the drama of the image. Scenes with this kind of tonality and bland color palette are ideally suited to black-and-white.

Think...

What You See Is
What You Get

Feel...

What Your
Eyes See

Do...

Just Shoot It!





ABOVE: Mesquite Dunes, Death Valley National Park, California. **LEFT:** Sand Storm, Death Valley National Park, California. **BELOW:** Morning Light, Death Valley National Park, California.

Try the following exercise to THINK, FEEL and DO in black-and-white. Shoot one subject you're passionate about every week for three months. Shoot 100 frames each session, use one camera, one lens, shoot on manual, use one ISO setting, explore every variable you can think of: light, shadows, texture, shape, form, low contrast, high contrast and tonality, and translate your images to black-and-white.

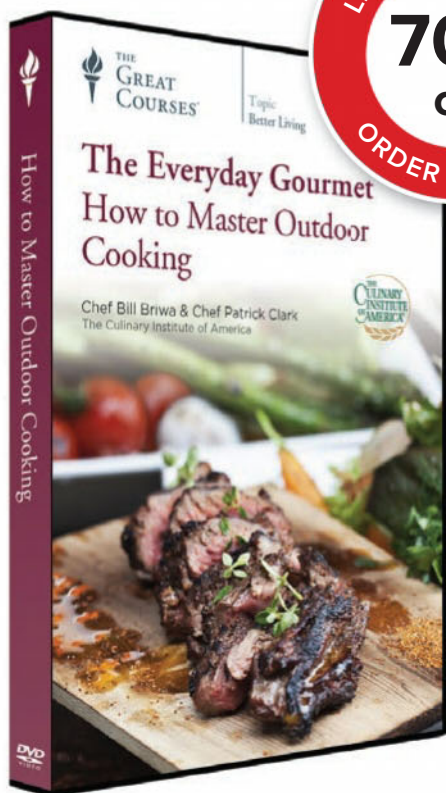
At the end of each month, look for patterns, consistencies and styles that speak to your personal and expressive interpretations of the subject. By the end of the exercise, you'll be able to see your subject in a whole new light.

Over the last year, I've focused on the Southwest and desert areas of the United States. Through this focus and single-minded approach, I've been fortunate to build a strong and more personal portfolio of photographs. So get out there, have fun, and remember to THINK, FEEL and DO in black-and-white. OP

You can see more of **Jack Curran's** striking black-and-white work at jackcurranphotography.com.

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Interpreting

The Landscape

**Black-and-white photographer Gary Wagner
brings a refined vision to the California landscape**

BY WILLIAM SAWALICH | PHOTOGRAPHY BY GARY WAGNER



There's an age-old question about zebras: Are they black with white stripes or white with black stripes? In the striking landscapes of Gary Wagner, there's no doubt: His prints are deep and dark with select areas of midtones and highlights. He's a photographer who loves the abstraction of black-and-white, the artistic interpreta-

tion it affords, and the mood and mystery of a finely made low-key print.

"My pictures are completely subjective," Wagner says, "and they aren't necessarily what's out there. I'm not trying to have a true visual representation of the scenes that I see, I'm trying to have my own interpretation. Generally, they're darker with areas of

lighter highlights. I find that, to me, they're more mysterious, more thought-provoking, that I, as well as others, may want to look further into those images in order to try and understand what I saw when I took them. When I go out, I'm not trying to copy the world and have it appear exactly as I see it. I often stand there and think, 'Well, if I was painting this scene, what would I do?'

"If you're a painter," he continues, "there's complete creative freedom to do whatever you want. Thoughts like that may be taboo to photographers, and certainly it has been a controversy for hundreds of years: Are photos a representation of the world, or are they an interpretation of the world? You know, I've been interpreting photos since day one with film. In the darkroom, I dodged and burned and did whatever I wanted in order to make that picture enhanced and show the beauty of what I saw and how I wanted it to look for others to see. I do the same thing with my photography now in digital. I interpret it, I change it, I make it look how I think it should and how I want others to see it. Now, I said all that, but, you know, all of my pictures are basically what I see. I don't do any extreme changes in my images, to put other parts in them or to incorporate multiple scenes; I don't do any trick photography. I don't do any of those things. Not that I feel that I shouldn't, but I don't. I do alter tones, as I always altered tones, in order to enhance scenes and make them appear the most pleasing to me that I can."

Wagner uses his DSLR much differently than his Zone VI 8x10 view camera. Not only can he more easily access a world of limitless compositional possibilities, he also relies on multiple exposures to produce an exceptionally wide dynamic range—much as he once relied on the Zone System of film exposure and development.

"For most of my photographs," he says, "I take multiple images, bracketing those, and I do HDR on a huge majority of my work. This is really because, having worked with film, and knowing the quality and detail in shadows is so important, and knowing how I want my highlights to look on film, and how much exposure I was going to put on that film when I photographed and when I processed that negative, I wanted to be able to have that same quality show up in my digital images. That was very important.

So I found that by doing this multiple type of exposure, I could capture stops more of shadow detail and highlight detail and combine them together in order to make those photos as similar in my mind to how my black-and-white film work was done and how my prints looked. I've found that you can take an individual raw image and people will say, 'The highlights are captured there, you know they are!' But I found that if I were to bracket it two stops, I could have so much more detail included in those highlights rather than just having monotone light gray highlights. I could have a tremendous amount of detail included in those highlights by doing this HDR process, so that really was a revelation to me to be able to make prints this way."

Typically, print quality is particularly important for black-and-white landscape photographers, and Wagner is no different. He was a serious darkroom

printer who has carried the same rigor into the digital darkroom.

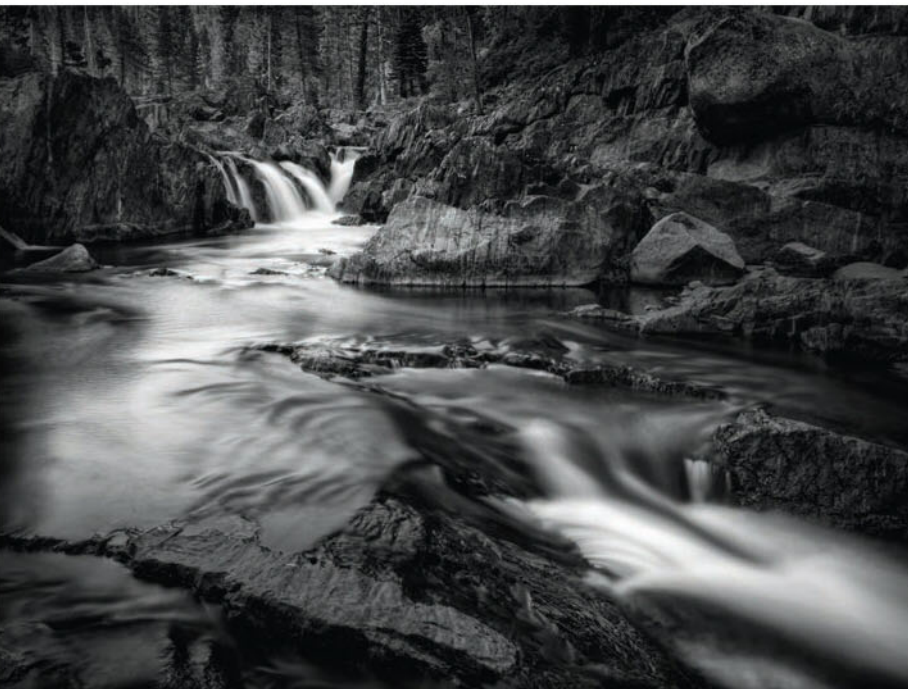
"The digital print today is a beautiful-looking print," Wagner says, "and I feel like it's just as exciting to look at as it was to look at those silver prints. My process is, first of all, after I take these images and look at them in Photoshop and pick ones that I like, I do my black-and-white conversion and then I make 8x10 proofs. I have stacks and stacks of images that I've made 8x10s of, to see how they come out. So, for my proofing printer, I have an Epson 3880, an Epson 4900 and an Epson 7880, for all of the prints that I'm currently making and showing. I'm using Epson K3 inks and doing those on an Epson 3880 and an Epson 7880 on Epson hot press and cold press natural papers. I find that the quality of the Epson inks works perfectly fine for me. I also have an Epson 4900, which I have Piezography ink in, sele-

nium ink in, and have been experimenting and working with it for the past three or four years. In the quest for making the best-quality prints out there, I've experimented not only with Piezography, but with other black-and-white alternative inksets, including making inks myself."

Wagner prints up to 20x24 inches from his Epson 7880. It's possible, he says, that if he had a larger printer, he would make larger prints.

"But that brings us to really the question," he says. "I went from the Canon EOS 5D Mark II—and I loved that camera—to the Nikon D800E because I wanted more pixels to make larger prints. But not everybody is as interested in making larger prints. Or even if they are, they may not need the quality of those larger prints to equal the same quality look as an 8x10. Even though we talk about quality, I feel like the prints that I make are really about





the scenes that I capture and the emotion of the landscape that I want to portray. But a whole other side of me is, like, 'But they still have to have a quality look to them,' because that's my historical background of how I look at and interpret photography.

"It's not important to everybody," Wagner notes, "having more megapixels. I find that black-and-white challenges digital files far more than color does. I think that flaws in that digital file, because of eliminating a lot of color from it, you're left with a much 'rawer' group of pixels than you have when you have that full color spectrum there. I feel like you need the best-quality file that you can possibly get if you want to retain all of the tones and highlights and shadows and pixel quality in there with black-and-white."

The scenes that most appeal to Wagner are often found in California, northern and southern, from the mountains to the sea. He spent the better part of a decade in Northern California, Tahoe and Yosemite,



Gary Wagner tends to gravitate toward scenes that produce a dark and moody look. He explains, "I feel like it has the style of the image I want to produce. Do I take some images that are high-key or lighter-toned images? I do, but I very seldom end up printing these images that I make like that. I just don't feel like they're very representative of what I see and want to show others."



To get the look he wants, Wagner makes certain to bracket every image. This gives him flexibility when he processes the images. "I now take five images in order to be able to get two stops above, normal and two stops below," he says. "And whether I use them or not doesn't really matter. I never have to worry about exposure, but I get the right exposure. Exposing to the right never is a concern to me."

photographing for his Sierra Mountain Wilderness project.

"I worked out there every season of the year," he says, "and I took thousands of images and loved being there and loved the outdoors and being able to—as I've often said to people—photograph rocks, trees and water. That's my studio, and that's what I do. I love being outdoors, and I love the surroundings, and I love capturing those images. I have lots of favorite images, but, you know, I think the ones I love the most are ones that are water-related."

From mountain streams and rivers to the coast's crashing surf, Wagner gravitates to water of all kinds. It's found in many of his images no matter the loca-

tion, and it even has formed the foundation of his current project—photographing the Pacific coast in Northern California and Southern Oregon.

"I love the movement of water," he says, "and the emotion that comes from it. I've photographed the ocean off the Pacific coast here for 20 or 30 years, but I'm really working now on producing a complete body of work and a show that I can have of my ocean images. I've found the ocean to be so exciting and interesting. I've just been spending days, weeks out there listening to it, looking at it, doing images and trying to capture and understand the water and the tides and the sounds, and how the water moves and how the fog interrelates with it and how the light strikes it.

"I took the techniques that I was using in order to do mountain waters and streams and rivers," Wagner says, "and I brought that to the ocean. Most of my images are long exposures. I photograph almost exclusively at sunrise and before, so there's very low light levels. And I do multiple long exposures in order to be able to create these images. Some are individual images, others are combinations of multiple long-exposure images put together in order to create a somewhat different look of the water. The waves are moving, the ocean is

constantly moving, the fog and the light are moving....

"I've long felt that black-and-white photography was the best way to show my vision to the world," he adds, "how I see things and portray light and shadows and tones and contrast and shapes and designs. I love the fact that it's not real. It's not what we see. It's an interpretation from the very beginning, and that's the reason why I continue to use black-and-white. Because I love that: being able to interpret it my way and show people that."

OP

Gary Wagner's Gear

Nikon D800E
AF-S **NIKKOR** 16-35mm f/4G ED VR
AF-S **NIKKOR** 24-70mm f/2.8G ED
AF-S **NIKKOR** 28-300mm f/3.5-5.6G ED VR

I have a 28-300mm Nikon, and, you know, it has never been considered one of the best-quality lenses out there, but it's a great one-camera lens that I can take when I travel—I take the majority of my images on that lens. Is the quality as good as the 24-70mm? It's not. But when I make the pictures, do I ever feel that it matters? Very seldom. I'm not shooting jewelry, and I'm not photographing things that require high-quality detail. I'm photographing scenes of nature that can be looked at and interpreted in any way that one wants to. And even though I feel that all of my images are sharp and clear, to use traditional terminology, the quality of the pixels between those lenses, you know, there's a quality difference, but very seldom does it ever really matter in the images that I make.



Gary Wagner's new book *"Digital Black & White Landscape Photography: Fine Art Techniques from Camera to Print"* is out now from Amherst Media. See more of his work at garywagner.com.

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Landscape photography just wouldn't be the same without wide-angle lenses. Superbly suited for the classic "near-far" style of composition (a staple for most landscape shooters), wide-angle lenses give you the ability to include generous amounts of foreground, background and sky simultaneously, creating photos with considerable depth and compositional power. While wide-angle lenses don't work perfectly for all scenes and circumstances, going wide nonetheless greatly expands your creative options.

Traditionally, anything wider than 35mm on a full-frame camera is considered a wide-angle lens; anything wider than 24mm is considered an ultra-wide-angle. For the purposes of this article, I'm excluding fisheye lenses, which are specialty lenses that haven't been corrected for the extreme barrel distortion inherent to wide-angle optics (barrel distortion causes straight lines to be rendered as curved). Lenses that have been corrected to allow straight lines to be rendered as (more or less) straight are known as "rectilinear" lenses. These days, lens manufacturers are increasingly pushing the wide-angle envelope, and now we're seeing ultra-*ultra*-wide rectilinear designs, the widest being Canon's new EF 11-24mm *f*/4L USM lens for full-frame cameras. The widest lens currently available for cropped-sensor cameras is the Sigma 8-16mm *f*/4.5-5.6 DC HSM lens, which has a full-frame equivalent focal length of approximately 12-24mm. Now that's wide!

But how do you use your wide-angle lens to its full potential? What follows are five of my favorite techniques for making great wide-angle photographs.



Do More With

WIDE-ANGLE

Master of Dreamscapes Ian Plant shows his top-five tips for great wide-angle photography

TEXT & PHOTOGRAPHY BY IAN PLANT

Get Low, Get Close, Get In Your Face!

1 If you want to wow viewers, get low and close to interesting foreground elements with your wide-angle lens. Wide-angles allow you to create photos with unusual and exaggerated perspectives, and they particularly excel at shooting near-far landscape compositions that include plenty of foreground. Although you don't need to include a foreground in every wide-angle land-

scape photograph you make, you'll find that foregrounds add considerable depth to your compositions and help lead the viewer's eye into the scene. Be sure to choose a foreground that's interesting!

The reason wide-angle lenses are so effective for near-far compositions is because of *perspective distortion*, which causes objects that are closer to the photographer to appear amplified in size compared to more distant objects, giving extra emphasis to the foreground subject.



The lens itself doesn't cause perspective distortion—rather, it's the way the lens is used—as the camera's position relative to objects in the scene makes them appear larger if close or smaller if farther away (this also makes the scene appear to “open up,” giving the appearance of extended perspective). Since wide-angle lenses are typically used closer to foreground objects than longer lenses, perspective distortion is very apparent, enhancing the appearance of depth.

So don't be afraid to get really close to your foreground, as doing so intensifies the perspective distortion effect. I like to fill the bottom part of the frame with my foreground, usually getting only a few feet away in order to take maximum advantage of perspective distortion. When getting really close to your foreground, you may need to use a smaller aperture to ensure sharpness from near to far (try $f/11$ or $f/16$ to make sure everything in your photo looks tack-sharp).

By going wide, I was able to include a progression of visual elements that leads the eye into the scene. Virgin Mountains, Nevada.

Canon EOS 5D Mark II, AF-S Zoom Nikkor 14-24mm $f/2.8$ G ED AF (with Canon EOS adapter), $f/11$, $1/13$ sec., ISO 100, tripod



2



4



Use Distortion Creatively With Converging Lines

2 Perspective distortion can make vertical or receding parallel lines appear to converge (for example, parallel railroad tracks will appear to converge in the distance). Although this happens with all lenses, it's most apparent with wide-angles. More problematic for wide-angle photography is what happens to vertical parallel lines, such as when you're in a forest and point your camera up: The tree trunks will appear to "lean in" and converge toward the center (the opposite happens when you point your camera down, with the tops of the trees appearing to lean out). Sometimes this distortion can be used creatively, but if you want to avoid it, put the horizon in the middle of the frame (you also can make corrections when processing the image).

Another distortion effect to be aware of is *edge distortion*, where objects appear unnaturally stretched and enlarged as they near the edges of the image frame, which is a result of rectilinear correction for the extreme barrel distortion inherent to wide-angle lenses. With some landscape subjects, this won't be an issue (distortion of the shape of an irregular landscape feature might not be obvious to viewers), but if shooting a scene where edge



2) Wide-angle perspective and edge distortion stretch and exaggerate the striations in the sandstone, creating an energetic radial pattern of converging diagonal lines. Antelope Canyon, Arizona.

Canon EOS 5D Mark III, AF-S Zoom Nikkor 14-24mm f/2.8G ED AF (with Canon EOS adapter), f/11, 3.2 sec., ISO 100

3) For this image of sandstone cliffs overlooking Lake Superior, I had to think carefully about what to exclude and how to meaningfully organize everything that I chose to include in the composition.

Pictured Rocks National Lakeshore, Upper Peninsula of Michigan.

Canon EOS 5D Mark III, Tamron SP 15-30mm f/2.8 Di VC USD, f/8, 1/40 sec., ISO 400, tripod

4) When high clouds started streaking overhead on a moonlit night, I reached for my wide-angle lens for a dramatic perspective. Quiver Tree Forest, Namibia.

Canon EOS 5D Mark III, AF-S Zoom Nikkor 14-24mm f/2.8G ED AF (with Canon EOS adapter), f/5.6, 30 sec., ISO 800

distortion is problematic, avoid placing important elements of your photo near the edges of the image frame.

With certain wide-angle subjects, however, the combined effect of perspective distortion and edge distortion can greatly enhance your composition. For example, when shooting parallel lines heading away from you, such as the striations found in many slot canyons, a wide-angle lens will render them as diagonal lines radiating from the edges of the image frame appearing to converge in the distance. Edge distortion amplifies

the effect by stretching and distorting the lines at the edges. The result is a compelling radial pattern that relentlessly draws the viewer deep into the composition.

The “Art Of Inclusion”

3 One of the many challenges of working with wide-angle lenses is to exclude elements that don’t contribute to the composition. At the very least, you have to be extra-careful to exclude obviously unwanted elements, such as feet, tripod legs, your shadow or other nearby photographers. Another thing to

be careful about is lens flare, especially when you’re pointing your wide-angle lens toward the sun (wide-angle lenses are harder to shade than longer lenses, so be extra-vigilant).

Good wide-angle photography takes more than just excluding the obvious: You also need to carefully choose your position and framing to exclude visual elements that detract from, or otherwise don’t contribute to, your overall composition. But, even more important, you need to think critically about the balance and placement of visual elements that



Wide-Angle Zoom Vs. Prime?

One of the most persistent myths in photography is that prime lenses are always and considerably better than zooms. In fact, many of the newest wide-angle zooms are as good as, and sometimes even better than, their prime lens counterparts. A high-quality zoom lens will give you much more artistic flexibility than a prime lens. Also, zooms are especially useful when you’re trying to optimize the relative sizes of your foreground and background elements. If you’ve zoomed out too much and your background is too small, you simply can back away from your foreground, zoom in (which makes your background larger) and reframe as necessary to find the best compromise between background size and foreground proximity.

I got very close to small ripples of sand in order to exaggerate their size relative to the background. As I was just a few feet away from the nearest ripples, I stopped down to f/16 to make sure everything in the photo was sharp from near to far. Namib-Naukluft National Park, Namibia.

Canon EOS 5D Mark III, AF-S Zoom Nikkor 14-24mm f/2.8G ED AF (with Canon EOS adapter), f/16, 1/40 sec., ISO 100

Canon EF 11-24mm f/4L USM

For years, wide-angle zooms were the weakest part of the lineup of the lens world. As digital sensor resolution increased, the flaws of these sometimes decades-old designs became increasingly apparent. Not anymore: The most recent wide-angle zoom designs from Canon, Nikon and others are a triumph of lens engineering. Canon's newest entry into this space, the EF 11-24mm f/4L USM rectilinear lens for full-frame DSLRs, offers the widest field of view (just over 126°) ever produced that hasn't been a fisheye lens. This lens is extremely sharp, and optical distortion is also well controlled throughout the zoom range—which is no small feat considering how wide this lens goes.

Note that this lens is designed for full-frame cameras. Cropped-sensor (APS-C) camera users considering this lens would be paying a lot of money for coverage they aren't using; they're better off getting an ultra-wide lens made specifically for APS-C cameras. Furthermore, this lens is a beast, weighing 2.6 pounds with a protruding convex glass front element, which is housed within an integrated "petal" hood for protection. Accordingly, only full-frame camera owners should consider buying this lens.



Torres del Paine National Park, Chile.

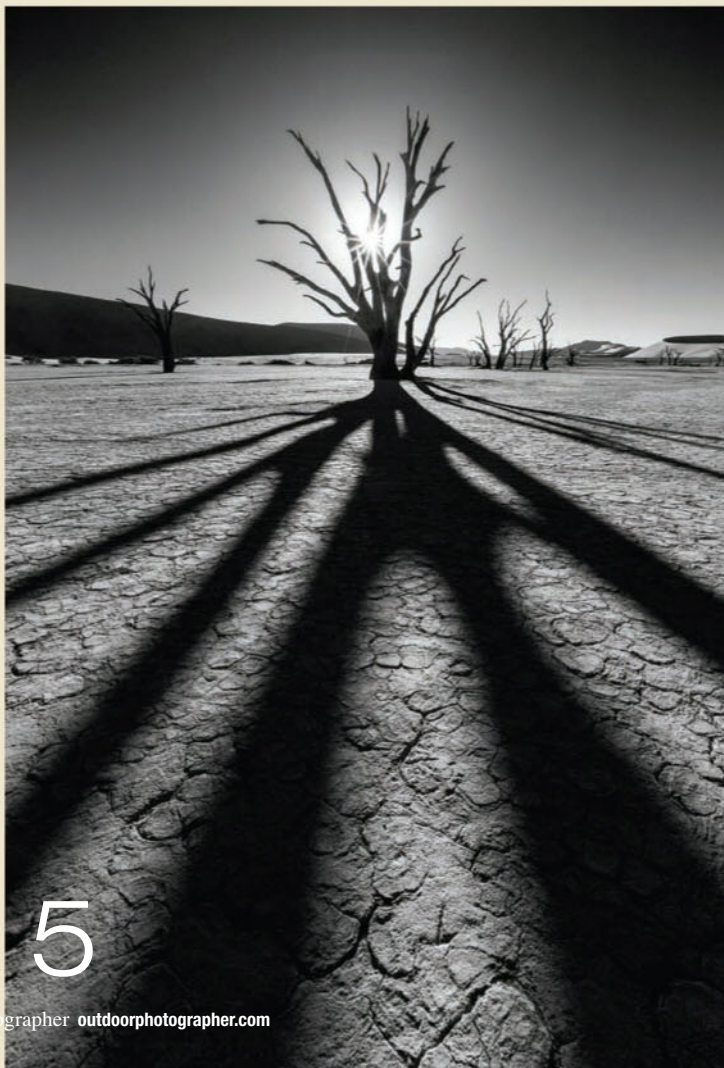
Canon EOS 5D Mark III, Canon EF 11-24mm f/4L USM, f/9, 1/8 sec., ISO 100, tripod

What does the world look like through an 11mm lens? The angle of view is, simply put, utterly ridiculous, perfect for really tight places (such as inside a slot canyon) or "big sky" sunrises and sunsets. So when huge storm clouds rose high above the Paine massif in Chile's Torres del Paine National Park,

I was able to include the incredible cloud formations that were towering almost directly above me—and I still had plenty of room for a generous amount of foreground. That's what a 126° angle of view will do for you!

Filter use will be difficult, but not impossible, with this new lens because of its protruding bulbous front element and integrated lens hood. Some companies (such as Fotodiox, LEE Filters and LucrOit) offer oversized filter holders for ultra-wide lenses, and it's only a matter of time before a holder for the new Canon 11-24mm lens is made available (although it remains to be seen whether a holder can be made big enough to fully cover the lens at the widest part of its zoom range). Canon clearly anticipated the filter problem, adding a rear gel filter slot to the lens (gels are thin acrylic or gelatin sheets used for color correction or neutral-density filtration). Of course, a rear filter slot isn't as flexible as a front filter holder—graduated neutral-density filters are clearly out of the question—but it's better than nothing.

Heavy and bulky? Unfortunately, yes. Expensive? At just under \$3,000, prepare to feel some pocketbook pain. Extremely sharp? Yes, from corner to corner at all apertures. The new ultra-wide king for full-frame cameras? It's difficult to conclude otherwise!



For this shot of a dead tree in the famous Deadvlei area of Namibia, I included the sun to make the composition more interesting. I partially blocked the sun with a tree limb to eliminate unwanted flare.

Canon EOS 5D Mark III, Canon EF 16-35mm f/2.8L USM, f/13, 1/160 sec., ISO 100, tripod

you *can't* exclude. Because wide-angle lenses have such a wide field of view, compositional complexity increases, and it becomes considerably more difficult to exclude unwanted elements. I like to call wide-angle photography the "art of inclusion"—the photographer must find a way to make given elements in the scene relate to one another in a visually pleasing way. Good composition requires skill no matter what lens you use, but finding a way to successfully include elements with a wide-angle lens is more challenging than working with the narrower view offered by longer lenses.

Big Skies, Go Wide!

4 When dramatic clouds fill the sky, *that's* when I really want to go wide—the wider, the better! Wide-angle lenses excel at "big sky" moments, giving you the opportunity to create compositions juxtaposing interesting foregrounds with dramatic clouds. Of course, I often have to be careful not to

go too wide; I make sure to include only those portions of the foreground and sky that are actually interesting, and that work well together to form a compelling composition. I also think critically about the placement of my horizon, sometimes excluding some of the foreground or sky in order to keep my horizon from being dead-center (although sometimes center placement works best).

Include The Sun

5 Wide-angle lenses are great when you want to include the sun in order to add an eye-catching point of interest. When working with a wide-angle lens and a small aperture, you can create an attractive “starburst” effect, sometimes also referred to as a “sunstar.” The smaller the aperture you use, the more pronounced the effect will be, although I generally avoid $f/16$ or $f/22$ in order to reduce diffraction, an optical effect resulting from using small apertures, which reduces overall image sharpness. Typically, higher-quality wide-angle lenses produce better starbursts, and some produce quality bursts even at wider apertures such as $f/11$ or $f/8$. To reduce or eliminate lens flare, partially block the sun with some feature of the landscape or sky, such as a tree limb, cloud or distant mountain. Don’t block the sun completely; make sure just enough light shines through to create a strong burst effect. **OP**



World-renowned professional photographer and Tamron Image Master **Ian Plant** is a frequent contributor to *Outdoor Photographer*, as well as a number of other leading photo magazines. See more of his work and download his free photography how-to ebook “Essential” at www.ianplant.com.

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My Move To Mirror

See what drove professional
photographer Dan Bailey
to set aside his DSLR in favor
of a mirrorless system

TEXT & PHOTOGRAPHY BY DAN BAILEY



less

IF YOU'RE AN ACTIVE OUTDOOR PHOTOGRAPHER, then you know that when you're trekking, skiing or scrambling in the mountains, cycling or traveling out of your pack, extra pounds slow you down. For this reason, I own lightweight hiking boots, lightweight backpacks and a one-pound sleeping bag. And, yet, for years, I carried a two-pound DSLR camera everywhere I went. Add in my ultrawide 14mm lens and the 70-200mm *f*/2.8, and I was lugging around 7 pounds. That's hard on your arms and back.

After accepting this trade-off for 20 years, I decided enough was enough. In late 2012, I did a weeklong bike tour with nothing but a compact Fujifilm X10 and felt joyfully liberated. While I still used my Nikons for some work, I couldn't escape the lure of mirrorless, and when the hot-rod Fujifilm X-T1 hit the market just over a year later, I wanted to see if it had what I needed to definitively make the switch.

Size and weight alone can't be the determining factor for a camera system, of course. As a pro outdoor adventure shooter, I need a rugged camera that produces high-end image quality and has fast, accurate AF tracking, high frame rates and a clear viewfinder. The X-T1 delivers all of that, plus it offers real-time image preview, live histograms and firmware updates that keep making it even better.

I like to pretend that Fujifilm designed the X-T1 especially for me, but after using it exclusively for over a year and a half, I've found it to be the perfect camera for my fast-moving style of outdoor photography. In fact, earlier this year, I traded in my Nikon DSLR gear and have transitioned to shooting Fujifilm 100% of the time, and I'm not looking back.

◀ Hiking Above Eklutna Lake, Alaska

I like to joke that my new favorite camera bag for my mirrorless cameras is the strap. To me, accessibility is the most important factor when it comes to carrying your gear, and a camera that's slung around your neck and shoulder is about as accessible as you can get. I often hike, ride bikes, ski, sometimes even run with my camera slung like this, so that when I see a great moment about to unfold, I can be ready to capture it almost immediately, instead of having to dig into my pack first to grab the camera.

The X-T1 is relatively lightweight, and it's weather-sealed, as is the 18-135mm lens, which makes the combo a great adventure photography setup. With DSLRs, you have to spend almost twice the money and carry almost twice the weight in order to get weather sealing.

Fujifilm X-T1, Fujinon XF18-135mm *f*/3.5-5.6 R LM OIS WR, 1/240 sec. at *f*/5.6, ISO 250

Fat Tire Snow Biking, Anchorage, Alaska ►

I shot this with the prototype X-T1 before it even was announced. I was blown away by how light the camera was, and yet how capable it was with regard to performance.

I've done shots like this in the past, where I clamp the camera to the top tube of my bike in order to create a dynamic first-person, but it's always a little cumbersome with DSLRs. Also, with my old DSLR, I'd have to set the self-timer, aim and hope for the best. The tilt-screen LCD on my mirrorless cameras offers an accurate real-time view of the scene, which makes it much easier to shoot photos with challenging angles that make it impractical or impossible to look through the viewfinder while shooting.

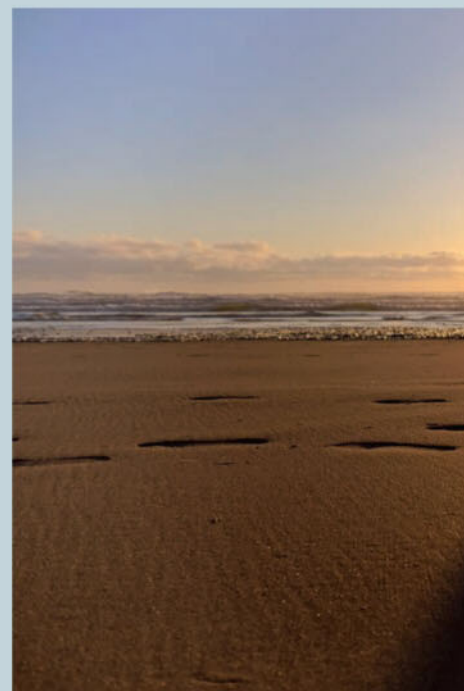
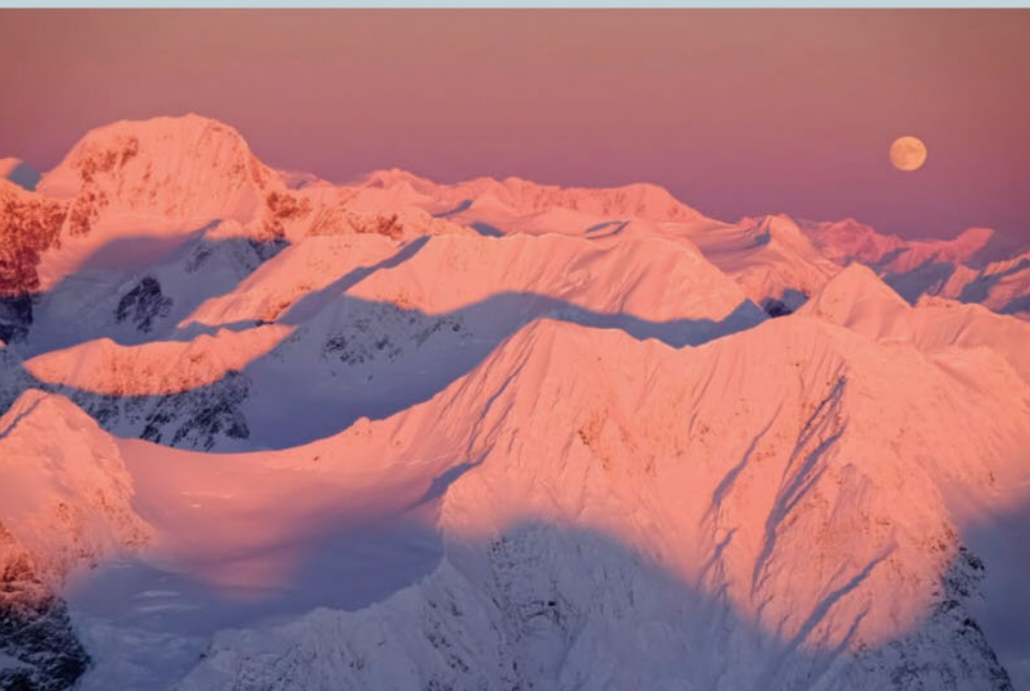
Fujifilm X-T1, Fujinon XF14mm *f*/2.8 R, $\frac{1}{25}$ sec. at *f*/4, ISO 400

▼ Mountain Climbers, Sólheimajökull Glacier, Iceland

I traveled to Iceland the day after I got the production-model Fujifilm X-T1 in February 2014, so this was one of the first opportunities I got to try out the camera. I shot this photo while trekking on the Sólheimajökull Glacier, and considering we were in pretty rugged terrain, it was quite refreshing to be using a lightweight setup.

Often when using mirrorless cameras, it's convenient to compose while looking at the LCD screen, but when you're wearing sunglasses and shooting in really bright light, like on a sunlit glacier, you can't see the LCD very well. That's where you need a real viewfinder. The EVF on the X-T1 proved to be so good that, in most lighting conditions, I totally forget that I'm looking at a tiny TV screen. It actually gives me a bigger magnification view than any DSLR I've ever owned. Between the EVF and the tilting LCD screen, this gives me a huge variety of options for composing my scenes.

Fujifilm X-T1, Fujinon XF55-200mm *f*/3.5-4.8 R LM OIS, $\frac{1}{1250}$ sec. at *f*/5.0, ISO 200





◀ Full Moon And Mount Gannett, Chugach Mountains, Alaska

I own a 1947 Cessna 120, which I use for shooting aerials of the Chugach Mountains, which are some of my most favorite and satisfying imagery these days. To me, they really capture the feeling of adventure, and to see these amazing scenes from the air is a magical experience. A typical aerial photography mission involves taking off about an hour before sunset and then chasing good light around the rugged peaks and massive glaciers until the color fades. Then I fly home and land just after dusk.

I was a hardcore Velvia shooter back in the days of film, so those vivid colors really bring me back, and they're perfect for bold-light mountain landscapes. Having the simulated Fujifilm emulsions built into my X-T1 is nice to have, and it's only in Fujifilm cameras.

Fujifilm X-T1, Fujinon XF18-135mm $f/3.5-5.6$ R LM OIS WR, $\frac{1}{680}$ sec. at $f/5.6$, ISO 800

◀ Running On The Beach, Oregon Coast

Some of the best vantage points you can get involve moving with your subjects, as if you were shooting film or video. Although I don't shoot much video, I employ some of those techniques to my still imagery to create a dynamic feel.

For this shot, I rode alongside the runner on a bike while holding the camera out next to me and shooting one-handed with my Fujifilm X-T10. Although it's designed as more of a consumer-level camera, the X-T10 has the same sensor and AF system as the X-T1, plus it's even lighter and more compact, which makes it a great little adventure camera. Although I've certainly shot one-handed many times with my DSLRs, my success rate is much higher with my mirrorless cameras.

Fujifilm X-T10, Fujinon XF18-135mm $f/3.5-5.6$ R LM OIS WR, $\frac{1}{800}$ sec. at $f/4$, ISO 200

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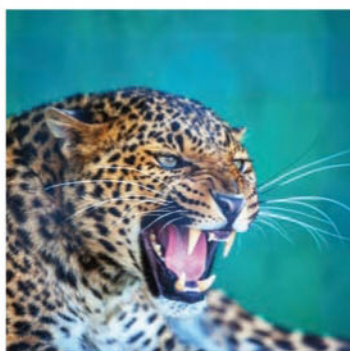
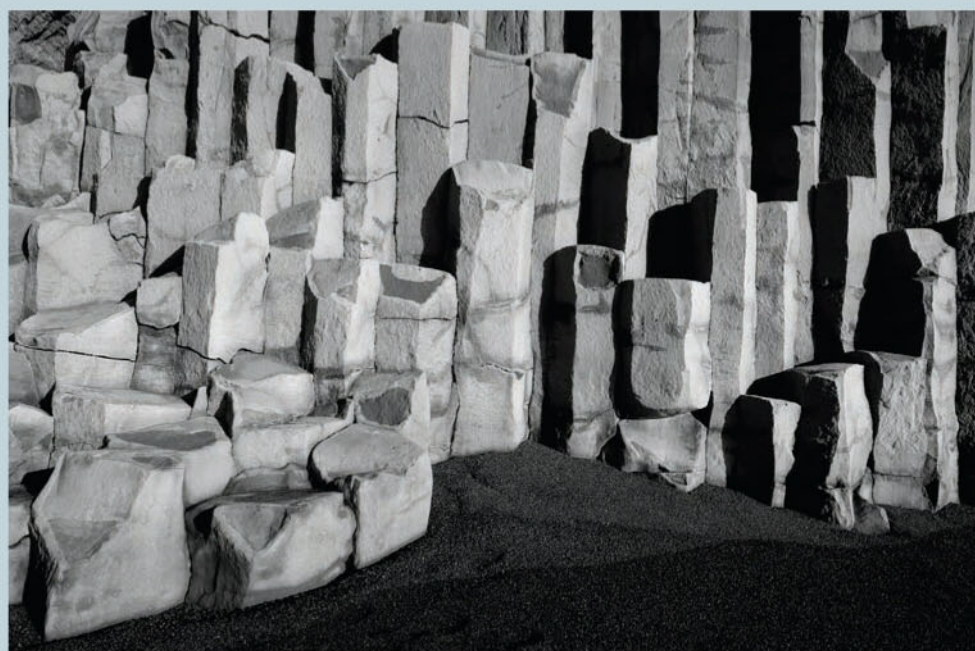


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▲ Basalt Columns, Reynisfjara Beach, Iceland

One of the things I like most about the Fujifilm mirrorless cameras, in particular, is that the creative color modes very closely replicate the classic looks of films like Provia, Velvia and Sensia and black-and-white emulsions. Not only do these looks bring me back full circle and inspire my creativity with different color palettes, they offer some very useful solutions when shooting in different lighting conditions.

When I came across this scene at Reynisfjara Beach on the southern coast of Iceland, it was midday, and the light was incredibly harsh—way too strong to make a decent-looking landscape photo in color. By switching to one of the black-and-white film simulations, which I previewed in the viewfinder, I was able to focus on the aspects of shape, form and contrast, and walk away with a great shot. This is one of my favorite photos from that trip.

Fujifilm X-T1, Fujinon XF14mm *f*/2.8 R, 1/100 sec. at *f*/9, ISO 100



▲ Winter Landscape, Anchorage, Alaska

During wintertime in Anchorage, the sun skims in a low arc across the sky. When the sky is clear, "magic hour" lasts all day long. I shot this photo at 2:36 p.m. on December 19, along the Chester Creek Greenbelt trail that runs all the way through Anchorage, Alaska. With such clear, cold air, the conditions were great for creating a sunstar effect, so I stopped the lens all the way down to $f/16$ and partially hid the sun behind the tree in the foreground to enhance the effect.

Although I was shooting in RAW+JPEG mode at the time, this photo is a straight JPEG with no color corrections. I tend to do minimal processing on my imagery, partly because I don't have hours to spend in Photoshop and partly because I love the challenge of nailing the shot in the moment. Having these kinds of results makes my job so much easier, and it takes a lot of the guesswork out of shooting photos. This isn't unique to mirrorless cameras, but I mention it because it's a feature I rely on that I didn't lose when I moved from a DSLR.

Fujifilm X-T1, Fujinon XF18-55mm $f/2.8-4$ R LM OIS, $\frac{1}{60}$ sec. at $f/16$, ISO 200

To see more of **Dan Bailey's** adventure photography, visit his website at danbaileyphoto.com.

► MORE On The Web

Go to outdoorphotographer.com for more in-depth articles on new cameras and camera technology, as well as comparison charts on available models.

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TO Mirror, Or

Pros and Cons: How do the latest mirrorless cameras stack up to DSLRs? What are their

FFor many years, 35mm SLRs were the mainstay of “general” photographers. Medium- and large-format offered better image quality through their larger film sizes, and held sway among fine-art, architectural, landscape and even wedding/portrait photographers for that reason (and, in the case of large-format and studio still-life, for the cameras’ perspective-correcting movements). But, by far, the most camera sales were 35mm SLRs for their compactness, speed, versatility and wide range of lenses and accessories, along with lower cost.

When digital took over, camera manufacturers essentially adapted their film camera designs, and we had DSLRs, medium-format digital cameras and digital backs that could be attached to medium- and large-format cameras.

It bothered some people, though, that there wasn’t more new thinking in terms of camera designs. DSLRs didn’t need room for film cassettes, and with the development and improvement of electronic viewfinders, the DSLR’s bulky, complex and costly SLR moving-mirror/prism-finder assemblies were no longer required. By doing away with the latter, manufacturers were able to produce much smaller cameras featuring the same sensors used in the DSLRs, thus providing the same image quality in a much smaller package. In 2008, Panasonic introduced the first mirrorless interchangeable-lens camera, the Lumix DMC-G1, which looked like a “mini-DSLR”—much smaller, but containing the same Four Thirds System image sensor used on Four Thirds System DSLRs: the Micro Four Thirds (MFT) System was born (Micro referring to camera size, not sensor size). This was soon followed by Olympus’ MFT E-P1, which featured a “flat” design like a compact digital camera and thus was even more compact, then models from Samsung and Sony containing larger APS-C sensors used in those companies’ DSLRs. Sony introduced the first full-frame, mirrorless interchangeable-lens camera, the a7, in 2013. Today, there are about as many mirrorless models on the market as DSLRs. Let’s look at the benefits and drawbacks of the two camera types for the outdoor photographer.



NOT To Mirror

strengths and weaknesses, and which one is best for you and your shooting style?

Image Quality

Since they use the same image sensors, mirrorless cameras and DSLRs of a given pixel count and generation offer pretty much the same image quality. But, as with DSLRs, bigger sensors generally mean better image quality: Full-frame mirrorless cameras produce better image quality than APS-C ones, which produce better image quality than Micro Four Thirds ones, which produce better image quality than mirrorless cameras with even smaller sensors, just as full-frame DSLRs produce better image quality than APS-C ones. The fact is, all of today's full-frame, APS-C and MFT mirrorless and DSLR cameras deliver very good image quality.

Size

Obviously, mirrorless cameras are smaller than DSLRs, especially the higher-end DSLRs (see the accompanying chart for some examples); that's their main *raison d'être*. If you've become disenchanted with lugging around a DSLR, a mirrorless camera may well be the solution.

The smallest mirrorless cameras have smaller-than-DSLR sensors—a 1/1.7-inch in the case of the Pentax Q-S1 and Q7, and a one-inch in the case of the Nikon 1 series. These systems offer ultimate compactness, but there's a cost in terms of image quality due to the small sensors.

The next smallest mirrorless cameras are the "flat" ones that look like compact digital cameras. These are great when size is the main issue, but many lack an eye-level electronic viewfinder and thus can be a bit awkward to use in bright light, as the image on the external LCD monitor can be hard to see (you can attach a device like a HoodLoupe to remedy this, but then the camera is no longer so compact). The "flat"-style cameras that do have built-in EVFs are ideal when size is a major issue, but you still want convenient eye-level viewing. (Note that tilting/swiveling touch-screen external monitors can also contribute greatly to ease of use, although image visibility in bright light remains an issue.)

The "mini-DSLR"-style mirrorless cameras are the largest, some the size of entry-level DSLRs. But they're still generally lighter than DSLRs and, overall, system size is smaller, making them easier for traveling.



Sometimes, it comes down to, “Do I want to lug the camera (and lenses and accessories) with me on this outing?” If you’re a photographer, of course, the answer is generally “Yes!” But many are finding it “Yes!” more often when a mirrorless system is at hand rather than a DSLR system.

Lenses

Lenses for mirrorless cameras are smaller and lighter than lenses for DSLRs, but sometimes not by as much as you’d think. That’s because a lens has to cover the sensor format; a lens that can cover a full-frame sensor has to be big enough to do that.

Keeping lens size down is also why there are few truly fast lenses for mirrorless cameras. While there are many faster than $f/2.8$ available for DSLRs, few are offered by the mirrorless camera makers. However, third-party lenses can be attached to most mirrorless cameras via adapters, and some of these lenses are very fast (albeit manual-focus only).

DSLRs also offer a wider range of native (AF, and designed for the camera) focal lengths: Canon, from an 8-15mm superwide zoom to an 800mm supertele, Nikon, from a 14-24mm superwide zoom to an 800mm supertele, and Sigma, from an 8-16mm superwide zoom to an 800mm supertele, for example. If you’re into supertelephoto or superwide-angle photography, or want superfast lenses, you’ll want a DSLR.

On the other hand, while the native AF lenses offered by their manufacturers are limited in range and speed compared to what’s available for DSLRs, mirrorless cameras can use a tremendous range of lenses from other manufacturers via widely available adapters. The short flange-back distances (the distance between the lens mount and the image plane) made possible by the elimination of the SLR mirror box mean you can use just about any lens for which an adapter can be found. You lose autofocus and sometimes automatic exposure control, but you have access to a tremendous range of lenses.

And, of course, the native lenses offered by the mirrorless camera makers do cover the most popular focal lengths, and are suitable to a wide range of outdoor photography, including landscapes and macro work. If some mirrorless models intrigue you, check out what lenses the manufacturer offers.

AF Performance

Most mirrorless cameras use contrast-based autofocus (CDAF), while DSLRs use phase-detection autofocus (PDAF) except in Live View mode, when they must use CDAF, because PDAF requires the SLR

mirror to be in the “down” position, while Live View requires it to be “up.”

Mirrorless contrast-detection AF is very fast in terms of establishing focus on a stationary subject, and more accurate than phase-detection AF because CDAF reads focus right off the image sensor, while PDAF depends on moving parts that must be aligned precisely. However, PDAF can determine in a single reading whether the subject is in focus, and if not, by how much it is out, and in which direction, while CDAF requires multiple readings. This makes PDAF better for predictive AF on quick action subjects like birds in flight. Some mirrorless cameras (and newer Canon DSLRs in Live View mode) offer hybrid AF systems, which place PDAF sensors on the image sensor itself. This makes for better performance on action subjects than CDAF alone, but still isn’t as good as PDAF.

Many mirrorless cameras offer touch AF on their external LCD monitors, terrific for video focus changes and handy for still work, especially for odd-angle shooting with cameras whose LCD monitor tilts and swivels.

For manual focusing, electronic viewfinders are often better than DSLR finders because you can zoom the image and adjust its brightness, and many cameras offer focus peaking, which highlights in-focus edges. And the focusing screens in DSLRs aren’t optimal for manual focusing—unlike those of film SLRs, DSLR focusing screens are designed for AF use, not manual focusing.

Viewfinders

DSLRs use pentaprism or (in lower-end models) dimmer pentamirror optical viewfinders, while mirrorless cameras use electronic viewfinders. Some mirrorless cameras don’t have eye-level finders; on those, you must compose and focus via the external LCD monitor, which can be difficult to see in bright daylight (DSLRs used in Live View mode have the same problem).

Which type of viewfinder is better is the topic of many a heated online debate. Some (especially longtime film SLR users) prefer DSLR optical finders because you’re seeing the image the lens is sending to the film. These photographers don’t like the electronic “video” image of the EVF being between them and their subject. Of course, the SLR finder image briefly blacks out as the mirror flips up so the image can be recorded, so it’s not really “continuous,” either.

Conversely, fans of the EVF like the fact that they’re seeing the image produced by the image sensor—the image as it will be recorded. EVFs can show the effects of white balance adjustments, exposure com-



Selected Mirrorless Cameras and DSLRs for Outdoor Photographers

Mirrorless	Sensor	Format	Normal ISO Range	EVF	Monitor	Top Video	Max. fps*	Built-In WiFi	Dimensions	Weight	Price**
Fujifilm X-T1	16.3 MP	APS-C	200-6400	2360K	3.0-in., 1040K Ti	1080/60p	8	Yes	5.0x3.5x1.8 in.	13.7 oz.	\$1,199
Fujifilm X-T10	16.3 MP	APS-C	200-6400	2360K	3.0-in., 920K Ti	1080/60p	8	Yes	4.7x3.3x1.6 in.	11.7 oz.	\$799
Fujifilm X-E2	16.3 MP	APS-C	200-6400	2360K	3.0-in., 1040K	1080/60p	3	Yes	5.1x2.9x1.5 in.	10.6 oz.	\$699
Leica T	16.5 MP	APS-C	100-12500	Accessory	3.7-in., 1300K To	1080/30p	5	Yes	5.3x2.7x1.3 in.	11.9 oz.	\$1,629
Olympus OM-D E-M1	16.3 MP	MFT	200-25600	2360K	3.0-in., 1037K TiTo	1080/30p	6	Yes	5.1x3.7x2.5 in.	15.6 oz.	\$1,299
Olympus OM-D E-M5 II	16.1 MP	MFT	200-25600	2360K	3.0-in., 1037K TiTo	1080/60p	5	Yes	4.9x3.3x1.8 in.	14.7 oz.	\$1,099
Olympus E-P5	16.1 MP	MFT	200-25600	Accessory	3.0-in., 1037K TiTo	1080/30p	5	Yes	4.8x2.7x1.5 in.	13.3 oz.	\$799
Panasonic LUMIX DMC-GH4	16.05 MP	MFT	200-25600	2359K	3.0-in., 1036K TiTo	4K/30p	7	Yes	5.2x3.7x3.3 in.	16.9 oz.	\$1,499
Panasonic LUMIX DMC-G7	16.0 MP	MFT	200-25600	2360K	3.0-in., 1040K TiTo	4K/30p	6	Yes	4.9x3.4x3.1 in.	12.7 oz.	\$799***
Panasonic LUMIX DMC-GF7	16.0 MP	MFT	200-25600	None	3.0-in., 1040K TiTo	1080/60p	5	Yes	4.2x2.6x1.3 in.	8.3 oz.	\$549***
Samsung NX1	28.2 MP	APS-C	100-25600	2360K	3.0-in., 1036K To	4K/30p	15	Yes	5.5x4.0x2.6 in.	19.5 oz.	\$1,299
Samsung NX30	20.3 MP	APS-C	100-25600	2359K	3.0-in., 1037K TiTo	1080/60p	9	Yes	5.0x3.8x1.6 in.	13.3 oz.	\$799***
Samsung NX500	28.2 MP	APS-C	100-25600	None	3.0-in., 1036K TiTo	4K/24p	9	Yes	4.7x2.5x1.7 in.	10.1 oz.	\$799***
Sony a7S	12.2 MP	FF	100-102400	2360K	3.0-in., 921K Ti	1080/60p	5	Yes	5.0x3.7x1.9 in.	15.7 oz.	\$2,499
Sony a7R	36.4 MP	FF	100-25600	2400K	3.0-in., 1229K Ti	1080/60p	1.5	Yes	5.0x3.7x1.9 in.	14.4 oz.	\$1,899
Sony a7 II	24.3 MP	FF	100-25600	2359K	3.0-in., 1229K Ti	1080/60p	5	Yes	5.0x3.8x2.4 in.	19.6 oz.	\$1,499
Sony a6000	24.3 MP	APS-C	100-25600	1440K	3.0-in., 921K Ti	1080/60p	11	Yes	4.7x2.6x1.8 in.	10.1 oz.	\$549
DSLRs											
Canon EOS-1D X	18.1 MP	FF	100-51200	SLR	3.2-in., 1040K	1080/30p	12	No	6.2x6.4x3.3 in.	54.0 oz.	\$5,999
Canon EOS 5DS R	50.6 MP	FF	100-6400	SLR	3.2-in., 1040K	1080/30p	5	No	6.0x4.6x3.0 in.	29.8 oz.	\$3,899
Canon EOS 7D Mark II	20.2 MP	APS-C	100-16000	SLR	3.0-in., 1040K	1080/60p	10	No	5.9x4.4x3.1 in.	28.9 oz.	\$1,799
Canon EOS Rebel T6s	24.2 MP	APS-C	100-12800	SLR	3.0-in., 1040K TiTo	1080/30p	5	Yes	5.2x4.0x3.1 in.	18.4 oz.	\$849
Canon EOS Rebel SL1	18.0 MP	APS-C	100-12800	SLR	3.0-in., 1040K To	1080/30p	4	No	4.6x3.6x2.7 in.	13.1 oz.	\$699***
Nikon D4S	16.2 MP	FF	100-25600	SLR	3.2-in., 921K	1080/60p	11	No	6.3x6.2x3.6 in.	41.6 oz.	\$5,999
Nikon D810	36.3 MP	FF	64-12800	SLR	3.2-in., 1229K	1080/60p	5	No	5.8x4.9x3.3 in.	31.1 oz.	\$2,999
Nikon D7200	24.2 MP	APS-C	100-25600	SLR	3.2-in., 1229K	1080/30p	6	Yes	5.4x4.2x3.0 in.	23.9 oz.	\$1,199
Nikon D5500	24.2 MP	APS-C	100-25600	SLR	3.2-in., 1037K TiTo	1080/60p	5	Yes	4.9x3.9x2.8 in.	14.9 oz.	\$749
Pentax K-3 II	24.35 MP	APS-C	100-51200	SLR	3.2-in., 1037K	1080/60i	8.3	No	5.2x3.9x3.1 in.	25.2 oz.	\$1,099
Pentax K-S2	20.1 MP	APS-C	100-51200	SLR	3.0-in., 921K Ti	1080/30p	5.5	Yes	4.8x3.6x2.6 in.	21.7 oz.	\$699
Sigma SD1 Merrill	14.8x3 MP	APS-C	100-6400	SLR	3.0-in., 460K	No video	5	No	5.7x4.4x3.1 in.	24.7 oz.	\$1,999
Sony SLT-A99	24.3 MP	FF	100-25600	2359K	3.0-in., 1229K Ti	1080/60p	6	No	5.8x4.4x3.1 in.	25.8 oz.	\$1,999
Sony SLT-A77 Mark II	24.3 MP	APS-C	100-25600	2359K	3.0-in., 1229K Ti	1080/60p	12	Yes	5.6x4.1x3.1 in.	22.8 oz.	\$899

Ti = tilting monitor

To = touch-screen monitor

* Maximum frames per second with AF for each frame

** Estimated street price

*** Street price with kit zoom

About five years ago, Sony quit making traditional DSLRs and introduced the **DSLT**: an SLR-like camera with a fixed semitranslucent mirror rather than the traditional moving mirror of a DSLR. When a DSLR mirror flips up out of the light path so light can reach the sensor to make an exposure, the PDAF system stops working because it stops receiving light, so you don't get PDAF in Live View mode. With an SLT camera, the mirror transmits most of the light to the sensor, while simultaneously reflecting some up to the PDAF sensor module. Thus, you get full-time PDAF and live view. Of course, you can't use a prism finder with this system because the small amount of light sent up to it would be too dim, so Sony uses a high-res EVF instead. This helps reduce complexity and bulk, and provides eye-level viewing with full-time PDAF, even for video. The downside is that a little less light reaches the sensor than with a conventional DSLR. Currently, Sony offers three models using this technology: the **SLT-A99** full-frame model, **SLT-A77** Mark II flagship APS-C model and **SLT-A58** entry-level APS-C model.



pensation and special effects, and can be adjusted for brightness in dim light (be aware that the viewfinder image gets noisier when this is done).

Note that many mirrorless cameras, when used at their fastest advance rates, don't show a real-time live image in the finder—there's a delay between frames, which can make it difficult to track quick, erratic action. That said, there's at least one photographer we know of who shoots birds in flight with EVF mirrorless cameras using old manual-focus SLR supertelephoto lenses and focusing manually (birdsinaction.com), so it can be done. Still, if you tend to specialize in birds in flight, we'd recommend a DSLR and AF lenses.

Stabilization

Image stabilization is especially important with mirrorless cameras that don't have an eye-level EVF because holding the camera out at arm's length to use the external monitor for composing and focusing isn't very stable. Some mirrorless cameras have in-body image stabilization (IBIS), where the sensor shifts to counter camera shake (Pentax and Sony DSLRs also use this method). With others, you can get stabilized lenses (Canon and Nikon DSLRs don't have IBIS, but many of their lenses have optical stabilization built in). Ironically, while Sony's DSLRs have IBIS, most of their mirrorless cameras do not (you need an OIS lens to get stabilization with these). However, Sony's new a7 II has five-axis IBIS. IBIS has the advantage of working with any lens, while in-lens stabilization can be optimized for that particular optical formula. Both types work (the five-axis systems in the Olympus

OM-D E-M1 and E-M5 Mark II, and Sony's a7 Mark II are especially effective); the main point is, you want stabilization—either in-camera or in-lens—if you shoot handheld a lot (which presumably you do with a mirrorless camera), especially if your camera doesn't have an eye-level EVF (which makes for more stable handholding).

Video

Mirrorless cameras tend to be better video tools because they provide eye-level viewing in Live View/video mode, something DSLRs don't do—with a DSLR, you must use the external LCD monitor to compose and focus videos. Mirrorless cameras also tend to have better AF performance for video—while not up to birds-in-flight standards, mirrorless CDAF is better than the CDAF employed by DSLRs in Live View/video mode. Three affordable mirrorless models can do in-camera 4K video (Panasonic's \$1,699 GH4 and \$799 G7, and the \$1,299 Samsung NX1), while the \$8,000 Canon EOS-1D C is the only DSLR that can do 4K in-camera. Sony's a7S mirrorless camera can do 4K video, but requires an external recorder to do so.

WiFi

Many of today's mirrorless cameras have built-in WiFi. This allows you to control your camera remotely from your smartphone or tablet (using the camera maker's photo app), transfer images wirelessly from camera to smart device or computer, and even geotag your images via the smartphone's GPS. While built-in WiFi is common with mirrorless, few DSLRs have it.

Battery Life

Since mirrorless cameras are in Live View mode all the time, and often use smaller batteries to keep size down, they won't get as many shots per battery charge as a DSLR. This isn't a huge deal, though, as extra batteries are relatively cheap and easy to carry (and you should carry spares even if using a DSLR).

Cost

Mirrorless cameras tend to give you more “bang for the buck” than DSLRs, sensor-wise, assuming you like EVFs and can live with the smaller choice of AF lenses. Sony's full-frame, 36.4-megapixel a7R mirrorless camera currently sells for \$1,999, while Nikon's full-frame, 36.3-megapixel D810 DSLR with similar sensor sells for \$1,000 more. And Sony's original full-frame, 24.3-megapixel a7 (introduced late in 2013) currently sells for \$998, about \$500 less than Nikon's full-frame, 24.3-megapixel D610 DSLR, which came out about the same time with a similar sensor. The highest-priced, non-full-frame mirrorless models sell in the \$1,200 to \$1,700 range, and are competitive with the top APS-C DSLRs in everything but action AF and lens selection (and offer some features the DSLRs lack, including 4K video).

Bottom Line

Mirrorless cameras offer DSLR image quality in a smaller, lighter package, near-real-time viewing of the image as it will be recorded, quick AF on stationary subjects and subjects moving across the frame, and generally better video capabilities. DSLRs offer a wider range of lenses, better AF on quick subjects moving toward the camera, bigger bodies (which could be advantageous when using bulky telephoto lenses) and “pure” optical viewing of the subject. You'll have to decide for yourself which type of camera better suits your needs. It's definitely a good idea to try out each potential purchase at a camera store (or by renting it) to see how you get along with its benefits and drawbacks.

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Aspen Photo Art by Larry Bennett

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—excerpt from Sage Spirit

ILCP Fellow Dave Showalter on making a difference with a camera and a focused mission

TEXT & PHOTOGRAPHY BY DAVE SHOWALTER

Ferrying my third load across rolling, unbroken sagebrush hills to a portable blind that's a speck in an immense landscape, I'm thinking of how rare, how ephemeral these moments are—that so few places like this remain. I zip open the blind and drop my heavy photo backpack as sunset paints the surrounding sage in gold and magenta on a tranquil spring evening in northwestern Colorado's Moffat County. A meadowlark sings from a sage top, and before I can get settled, there's a rapid wing flap, then another, and more—greater sage-grouse arriving to roost on the lek. After a restless night of anticipation, more birds arrive at 4:45 a.m. until there are 60 males, so close to my blind that I can hear every syl-

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THIS SPREAD: Tracks lead from the Boar's Tusk, a 400-foot volcanic monolith landmark in the Killpecker Sand Dunes Wilderness Study Area, Wyoming Red Desert. ***ABOVE, LEFT:*** A Brewer's sparrow sings from the highest perch in a stand of Wyoming big sagebrush in Black Canyon of the Gunnison National Park, Colorado. The Brewer's sparrow is a sagebrush obligate species and declining at a rate of 2% per year. ***ABOVE, RIGHT:*** Sandhill cranes wade in their flooded wetlands before taking flight from the evening roost. Cranes prefer to roost in shallow water for protection from predators. The Rocky Mountain sandhill crane population winters at Bosque del Apache National Wildlife Refuge in New Mexico and migrates to northern Colorado and throughout Greater Yellowstone through breeding season.

RIGHT: Elk seem to pour from the Gravelly Mountains onto the Madison River Valley in Montana. Elk and other ungulates migrate from the deep snows at higher elevations to wind-blown sagebrush where they forage through winter. **BELOW:** A Gunnison sage-grouse male displays for a nearby female on a lek, or mating ground, on private land in the Gunnison Basin, Colorado. **FAR RIGHT:** American bison graze on Antelope Flats with a backdrop of the Teton Range. Golden grasses and snow-covered mountains are telltale signs of the transition from autumn to winter.



lable of the outlandish male sage-grouse display—wings swishing, air sacs popping, the deep growl on air intake and brief fights between males—all in absolute darkness. The wait to make images is agonizing, the moment timeless.

Light comes, first blue, then gold, and the intimate photo experience is exhilarating, especially when two females appear in front of the blind and are surrounded by males strutting and displaying for the right to mate. Sometimes, I just lower the camera and smile. I'm awestruck each time I have the privilege to view these remarkable birds.

In spring, imperiled greater sage-grouse and Gunnison sage-grouse congregate on mating grounds called leks to perform one of the great mating displays in the natural world. Sage-grouse flock to their same lek year after year—an open grassy area in the sagebrush, often a nondescript rise to better view approaching predators. Icons of

the West, these sagebrush obligates are hard-wired to sage—mostly *Artemisia tridentata*, or big sagebrush, the dominant aromatic shrub species covering valleys and basins of the Intermountain West. Greater sage-grouse are a candidate for protection under the Endangered Species Act (ESA), and Gunnison sage-grouse, numbering around 4,500 individuals, were designated as “Threatened” under the ESA in November 2014. Sage-grouse are frequently called umbrella or indicator species because good sage-grouse habitat is vital to so many other wildlife species. This ecosystem called the sagebrush sea is so rich in biodiversity that some 350 wildlife species—from tiny Brewer’s sparrows to grizzly bears—rely on healthy, unbroken sagebrush to thrive.

Now in my seventh year of the “Sage Spirit” project, I’ve photographed both species of sage-grouse from portable hunting blinds each spring, viewed grouse through the eyes of others in public viewing blinds, camped in natural gas fields, and hiked, mountain-biked and flown over wild, unbroken sage, canyons, plateaus, mountains, riverine corridors, ranch lands, wind farms and mega-energy developments. The aerial perspective reveals opportunity and loss—how all of the pieces fit together and where the land is fragmented into remnants of the sagebrush ecosystem. You’d think the western landscape would look bigger from 1,500 feet, but it’s the opposite once all the human features are laid bare.

My personal sagebrush journey grew from a growing concern for wild places lost during the energy rush when the fracking boom kicked into high gear around 2000. Suddenly, once-thriving areas were transformed into sacrifice zones, and places like Colorado’s Roan Plateau and Vermillion Basin, and Wyoming’s Red Desert and Absaroka Front were among the most threatened landscapes in America. Removing habitat pulls the rug out from under wildlife that needs room to roam freely, and alongside sage-grouse, a wide range of declining species added to a growing concern focused on the collapsing sagebrush ecosystem. Perfectly named, sage-grouse spend their entire life cycle in sagebrush. It’s vexing that they’re often lazily compared to a chicken with a peculiar dance and portrayed as somehow standing in the way of development; sage-grouse have been here for millions of years. Look deeper, and you’ll see that the Brewer’s sparrow, sagebrush sparrow, sage thrasher, pygmy rabbit, mule deer, golden eagle and land mammal migrations are all on the same diminishing path that has land managers concerned about a cascade of endangered species.

Secretary of the Interior Sally Jewell has pointed to collaboration as the key to keeping greater sage-grouse off of the Endangered Species list and conserving the sagebrush ecosystem. Some may be surprised to learn that ranchers, conservation groups, several energy companies, sportsmen, scientists, other stakeholders



(you and me) and government agencies are coming together to find common ground and solve complex issues. Leading up to the ESA listing decision, the U.S. Fish and Wildlife Service has mapped Priority Areas of Conservation across the 11-state, 165-million-acre (257,000 square miles) region occupied by greater sage-grouse. About two-thirds of these western lands are managed by the Bureau of Land Management (BLM). Because sage-grouse are an umbrella species, this landscape-scale conservation planning effort will conserve habitat for wildlife species of concern across the West. It's complicated, inexact, and we'll still need to make room for migrating ungulates and apex predators, yet this collaborative approach is a way forward.

When the Gunnison sage-grouse

were recognized as a separate species in 2000 (creating greater sage-grouse and Gunnison sage-grouse designations), the extended Gunnison, Colorado, community realized the Gunnison sage-grouse was already endangered (although not yet protected under the ESA). Some locals feared changes to land management practices in this small ranching, tourism, adventure, academic community in west-central Colorado. Most Gunnison sage-grouse are concentrated in the Gunnison Basin that's ringed by the Sawatch, Elk and San Juan mountain ranges, with several small satellite populations spread out west of Gunnison, in eastern Utah and southwestern Colorado. Smaller than greater sage-grouse, Gunnison sage-grouse differ in a number of ways, notably size,

broad white bands on tail feathers and very different vocalizations. Working groups formed after the species designation, as western stakeholders from all walks of life came together to save their namesake grouse by conserving habitat and changing land-use policy. Today, Colorado Parks and Wildlife oversees a regional Gunnison Basin Sage-grouse Strategic Committee, ranchers are enrolled in conservation programs, habitat improvement programs are in place, seasonal closure of two-track roads and trails, and shed-antler hunting protect sensitive habitat, and, although tenuous, the Gunnison Basin population is stable at around 4,000 birds. The lingering concern is that wildfire, drought or anymore habitat loss could cause a rapid decline. The people of Gunnison stepped up in the spirit of collaboration to save a species when the Gunnison sage-grouse was barely known outside of the Gunnison Basin.

What can we do as photographers who care about the West? Anyone can use photography to advance conservation. We can bear witness and use our images and collective voices to attest why the sagebrush sea matters, showcase the remarkable beauty and biodiversity of the only sagebrush ecosystem, and bring more fellow stakeholders to the table. As Americans, we all own a deed to these lands. You can pull on any thread in the story—beauty of the landscape, habitat loss, sagebrush songbirds, migrations, our human connections to the land, mule deer in decline—then share your images and encourage folks to support scientists and conservation groups doing great work. Audubon Rockies, Sierra Club Wyoming and The Wilderness Society are leaders in sagebrush conservation and partners of the “Sage Spirit” project, and there are many regional groups engaged in sagebrush issues. Grassroots conservation with compelling imagery is our most powerful tool for change. **OP**

***Dave Showalter** is a Colorado-based conservation photographer, an author and an Associate Fellow of the International League of Conservation Photographers. Sage Spirit is published by Mountaineers Books and is the foundation of a multiyear conservation campaign focusing on the eastern half of the sagebrush sea. See more of his work at www.daveshowalter.com.*

Dave Showalter's Gear

- ▶ **Nikon D3S** for wildlife and aeriels
- ▶ **Nikon D800** for landscape, aeriels and video
- ▶ **Nikon D300** for all-around and time-lapse
- ▶ **Nikon D7100** for all-around shooting and hiking light
- ▶ **Nikkor 16-35mm, 24-120mm, 80-200mm, 80-400mm, 600mm, 70-180mm macro and a few DX lenses**
- ▶ **Sony RX100**
- ▶ **GoPro**
- ▶ **Gitzo tripod**
- ▶ **Kirk ballhead**
- ▶ **Kirk King Cobra** for my big lens
- ▶ **Kirk window mount** for shooting from the vehicle
- ▶ **Portable hunting blinds** mostly for sage-grouse
- ▶ All of my aeriels were made with the support of **LightHawk**, a conservation organization of volunteer pilots



CLOCKWISE FROM TOP:

Nikon D3S; Gitzo Carbon-Fiber G1228 Tripod; Nikkor 16-35mm; Sony RX100



Traveling With BATTERIES

Decoding the fundamentals behind the power inside your devices
and how to safely take them on the road and into the sky

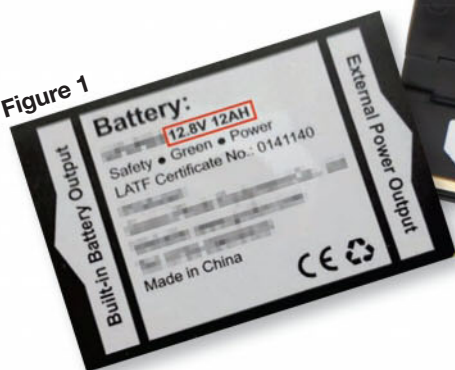
BY DOUG SPERLING



As of late, there has been a large crackdown on transporting batteries in carry-on or checked baggage via domestic or international travel, as well as in shipped packages using FedEx, UPS or your favorite carrier. The DOT, the TSA and Homeland Security, as well as international organizations, govern all methods of transport of any battery, and in addition to these domestic and international laws, many companies take the aforementioned restrictions and raise them to an even higher level. If not properly protected or stored, batteries have the potential to generate a tremendous amount of heat and potentially can catch fire.

Why do the rules differ for carry-on versus checked bags when you're on a flight? How many different batteries (including lithium) are there? How do I know which batteries I have, and will I have problems transporting them? We'll address these questions to help you avoid problems flying with, checking or shipping your batteries.

Figure 1



Batteries

Believe it or not, the rules of transporting batteries are fairly lenient if you understand why such rules are implemented. It's all about the type, size, content and capacity of the batteries that determine how many you can carry and where you can store them for travel or transport. (We'll discuss how to calculate these factors later in the article.)

For the most part, this is a discussion about lithium-ion (Li-ion) batteries, as they're now the most common "portable power devices" used in laptops and cameras, as well as the power packs for our portable strobe heads. A couple of characteristics that make the Li-ion battery so attractive is that it's extremely lightweight and packs a powerful punch while quick to recharge compared to its lead (Pb) predecessors.

When purchasing batteries to use in your equipment, don't skimp on third-party knockoffs just to save a few dollars. Camera equipment manufacturers go through painstaking research and testing to make sure their products work optimally within their families. Be cautious of third-party vendors, as potential damage may come to your equipment, and should something go wrong, there goes the warranty.

To start, there are four basic categories of battery:

- 1** Dry-cell alkaline batteries: typical AA, AAA, C, D, 9-volt, button-sized cells, etc.;
- 2** Dry-cell rechargeable batteries: nickel metal hydride (NiMH) and nickel cadmium (NiCad), also in various sizes;
- 3** Lithium-metal batteries: Non-rechargeable lithium, also known as primary lithium;
- 4** Lithium-ion batteries: Rechargeable lithium, lithium polymer (LiPo) also known as secondary lithium.

Figure 2



Note the distinction between lithium-metal and lithium-ion; they're two entirely different types of batteries, and calculating their size and content may mean the difference between taking or leaving your batteries behind during travel.

Lithium Metal Vs. Lithium Ion

Lithium-metal batteries are those that are non-rechargeable and come in various sizes, which include AA, AAA, 123, CR123A, CR1, CR2, CRV3, CR22, 2CR5, etc., as well as the flat, round lithium button batteries. These are also referred to as primary lithium batteries, and while powerful and longer-lasting compared to their dry-celled brothers, they tend to be more expensive, as they're non-rechargeable and must be disposed of properly.

Lithium-ion batteries are rechargeable, with sizes ranging from AA and AAA, to cell phone, PDA, still/video camera, tablet, standard laptop computer and power tool batteries. Also known as secondary lithium batteries, they include a category of lithium-polymer batteries, as well.

What Size Is My Battery?

Contrary to popular belief, the *physical* size doesn't determine the *categorical* size of the battery. Both lithium-metal and lithium-ion batteries fall into small, medium and large sizes, and all are determined by their content. The airlines and shipping companies are concerned with the categorical size (content) and not necessarily the physical size of the batteries they're transporting. As such, it's possible that your camcorder battery is considered to be a medium-sized battery despite the small physical size. Table 1 shows the specifications associated with the categorical sizes of batteries.

Lithium-metal batteries are measured by the amount of lithium alloy, or metal content (how many grams of Li

exist within), and lithium-ion batteries are measured by the equivalent lithium content (ELC). In order to determine a categorical size, one needs specific information that should be printed on, affixed to or associated with the battery in question. If there's no information given (as mandated by law) relative to the Li-ion battery, caveat emptor and the opinion is to stay away.

Somewhere on your battery there should be printed information regarding its specs, normally given in volts (V), watt-hours (Wh), amp-hours (Ah) or milliamp-hours (mAh). To determine the categorical size of your Li-ion battery in Li content, ELC or watt-hours of the battery, simply plug in the manufacturer's numbers using one of the three equations below. Note that watt-hours generally are the easiest to calculate.

- To find watt-hours (Wh) from amp-hours (Ah):

$$\text{Wh} = \text{Ah} \times \text{Volts}$$

- To find watt-hours (Wh) from milliamp-hours (mAh):

$$\text{Wh} = (\text{mAh} / 1,000) \times \text{Volts}$$

- To find ELC (equivalent lithium content):

$$\text{ELC (g)} = \text{rated capacity (Ah)} \times 0.3$$

Referring to Figure 1, let's determine the categorical size of the battery. It has 12.8 volts and a 12 Ah capacity. In this instance, there's a need to convert amp-hours to watt-hours. Using the $\text{Wh} = \text{Ah} \times \text{Volts}$ equation, one can enter the manufacturer's numbers so that $\text{Wh} = 12\text{Ah} \times 12.8\text{v}$.

The Wh is 153.6, and according to Table 1, a battery that's between 100 and 300 Wh is a medium battery.

Referring to Figure 2, if the manufacturer supplied the mAh and V, use the equation: $\text{Wh} = (\text{mAh} / 1,000) \times \text{Volts}$ to determine the equivalent watt-hours: $\text{Wh} = (3400/1,000) \times 7.2$.

Based on the equation, $\text{Wh} = 24.48$, thus anything up to 100 Wh is a small-sized battery.

If necessary, use the equation $\text{ELC (g)} = \text{rated capacity (Ah)} \times 0.3$ to determine content and ELC.

In Table 1, you'll see there are cells and batteries, and by definition:

- A battery is two or more cells electrically connected together by permanent means, including case, terminals and markings.

(Cont'd on page 88)



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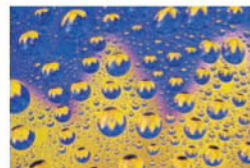
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For more information, contact: Sigurjón Petursson/Thora Hronn, +(354) 894-0652, sigurjonp@gmail.com, thorahronn@gmail.com, www.sigurjonpetursson.com.

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historic era still roaming the earth to this day. Co-led by naturalists and photographer trip leaders, these wildlife viewing expeditions take place in the fall, at a time of year when musk-oxen gather in larger groups to perform their mating rituals. Hours can be spent watching these amazing creatures. Located on the fringe of the southbound migratory route of the Leaf River caribou herd (the largest herd remaining in Canada), Great Canadian Wildlife Adventures' remote camps also offer great opportunities to spot caribou singles and small herds as they roam and graze the forever-reaching and rolling sub-Arctic landscape. All this activity occurs on incredible backdrops of rich autumn colors, as the tundra turns into a brilliant display of orange, yellows and gold, with fiery red outbursts of bearberries and cranberries. On clear nights, the famed aurora borealis come to light up the sky in a magical dance, weaving bright-green glows and mesmerizing purple shades amongst the stars. Reserve one of the few spots left for September 5-9 or September 9-14, 2015.

For more information, contact: Great Canadian Wildlife Adventures, (608) 370-5071, tundra@thelon.com, www.thelon.com/caribou.htm.



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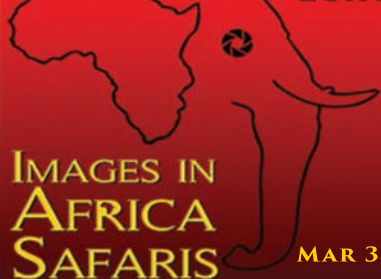
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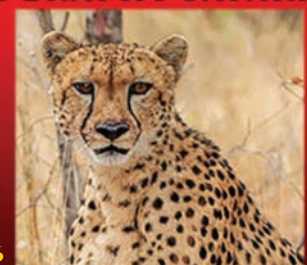
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You can do a lot in postprocessing with a digital image, and many digital cameras have built-in filters, but there's still a good case to be made for using some on-lens filters for black-and-white photography.

Some effects can't be simulated in postprocessing. For example, a polarizer can reduce or eliminate reflections from nonmetallic surfaces (water, glass and the like), as well as reduce the effects of atmospheric haze to improve contrast. A neutral-density filter can let you shoot at water-blurring shutter speeds even in bright light, for another. Tips: If you intend to use the camera's built-in metering or AF system, use a circular polarizer rather than a less costly linear one. The latter will interfere with metering and AF operation. A set of ND filters in various strengths can be costly; a better choice for black-and-white work is a variable ND filter, which lets you adjust the strength, as needed (variable ND filters can cause color shifts as their strength is increased, but that's not an issue in black-and-white).

Black-and-white shooters have long

used colored filters to control tonal rendition in their images. A colored filter transmits light of its own and similar colors, while blocking light of complementary color. Thus, a yellow or red filter can be used to darken a blue sky in a landscape shot so white cloud buildups stand out dramatically. Colored filters can also be used to provide separation between objects in a scene that would appear as about the same shade of gray without the filter. For example, red flowers and green leaves reflect about the same amount of light, so both appear about the same shade of gray in a black-and-white photo. Shoot through a red filter, and the red flowers appear lighter while the green leaves appear darker; conversely, a green filter will "lighten" the green leaves while "darkening" the red flowers.

Graduated ND filters can be used to reduce the brightness of the sky in a landscape so you can record detail in both sky and shaded foreground with a single

exposure. HDR techniques mean digital photographers have less need for grad ND filters than film shooters, but they're still useful accessories.

A number of manufacturers offer photographic filters. Here's a look at some of the most popular:

B+W

Founded in 1947 in Berlin by Herrs Biermann and Weber, B+W merged with Jos. Schneider Optical Works of Bad Kreuznach, Germany, in 1985. B+W's MRC multi-coatings were the first water- and dust-repellent coatings. B+W offers circular polarizers (including Kaesemann ones that transmit more light than conventional polarizers), neutral-density filters from 0.3-3.0, plus the five-stop XS-Pro Digital ND Vario MRC nano, graduated ND and colored filters (yellow, orange and red) for black-and-white photography. They're screw-in glass filters with brass mounting rings in sizes from 37mm-122mm.

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Cokin

The French Cokin company offers a wide line of rectangular filters that slip into the Cokin filter holder (available in four sizes), which can be attached to lenses with diameters from 36mm to 112mm via adapter rings—you buy a holder, the desired filters and adapter rings to fit each of your different-diameter lenses. Cokin offers gray (ND), graduated gray, circular polarizing and colored filters among their wide variety. They also offer very thin Pure Harmonie circular filters, among them a circular polarizer and a 2- to 8-stop variable ND. www.cokin-filters.com

Heliopan

German filter manufacturer Heliopan, founded in 1949, offers a wide range of quality filters made of Schott glass mounted in brass rings. These include circular polarizers, NDs from 0.3-3.0 (some special order), vario gray that provides strengths from 0.3-1.8 (1-6 stops), graduated NDs and colored filters (yellow, orange and red). www.macgroupus.com

Hoya

Japan's first specialty manufacturer of optical glass, Hoya has been in business for more than 70 years. The company offers a wide range of filters featuring its own optical glass, including neutral-density, variable ND (1.5-9 stops), super-thin designed-for-digital PROND2 through PROND1000 (1-10 stops) ND filters, PRO1D digital circular polarizer and colored filters (including red, orange, yellow and green for black-and-white work), with the color added to the glass while in its molten state, rather than a gel laminate between glass covers. www.kenkotokinausa.com

Kenko

The Japanese Kenko company offers circular polarizers, and neutral-density and variable-ND filters made of optical glass. The Zeta EX Circular Polarizer is the world's thinnest and lightest circular polarizer. The Variable NDX delivers densities from



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2.5X-1000X (practical maximum 450X), or 1.5-8.5 stops (beyond 450X, polarization problems render images unusable with all variable ND filters). A depolarization plate minimizes color shifts at higher strengths. www.kenkotokinausa.com

LEE

LEE Filters offers a system featuring holders in three sizes, adapter rings and a variety of filters, both acrylic and glass. The Seven5 holder is for compact-system cameras (mirrorless), and takes 75mm filters and adapters from 37mm-72mm. The 100mm holder takes 100mm filters and adapter rings from 49mm-105mm. The SW 150 holder takes 150mm filters and is for superwide-angle lenses. Filters include the ProGlass ND in 0.6 and 0.9 strengths, Big Stopper (10-stop ND), Little Stopper (6-stop ND) and Landscape Polariser (large-diameter thin filter that can be used with 15mm-17mm lenses on a full-frame sensor), plus many others. Each filter is handmade and individually inspected before it leaves the factory. www.leefilters.com

Marumi

For more than 60 years, Marumi has been making camera filters in Japan, introducing Digital High Grade filters in the early days of digital. Marumi offers circular polarizers, neutral-density filters (including a 100000X one for photographing solar eclipses) and a nine-stop VariND filter. The EXUS line features the best quality, followed by the Super DHG line, the DHG line and the Fit & Slim line—Marumi offers something for every photographer. www.argraph.com

Pro-Optic

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Singh-Ray


Singh-Ray offers high-end filters, including some unique ones. The Mor-Slo Solid Neutral Density Filters (glass) come in 5-, 10-, 15- and 20-stop strengths, while the George Lepp (a familiar name here at *OP*) Solid Neutral Density Filters (optical resin) come in 1-, 2-, 3- and 4-stop strengths. The Vari-ND Circular Variable Neutral Density Filter (glass) provides from 2-8 stops of light reduction. The Galen Rowell (another familiar name to longtime *OP* readers) Graduated ND Filters (optic resin) come in hard- and soft-edged versions in 1-, 2-, 3- and 4-stop strengths. The Gold-N-Blue Polarizer can enhance contrast in black-and-white images of scenes containing those colors. www.singh-ray.com

Tiffen

New York-based Tiffen has been making filters for the motion-picture industry, as well as pro and other still photographers, for more than 75 years, and has been recognized by the Academy of Motion Picture Arts and Sciences and the Academy of Television Arts & Sciences for technical achievements. Tiffen offers high-quality circular polarizers, ND filters (0.3, 0.6 and 0.9 strengths) and colored filters (yellow, deep yellow, red, green and blue) that work well for black-and-white as well as color photography. tiffen.com

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18 MP

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45/1.8 [T6] 2D/3D.....	CALL	20-50/3.5-5.6 ED II.....	CALL
60/2.8 Macro ED OIS SSA.....	CALL	50-200/4.5-6.7 ED OIS II.....	CALL
85/1.4 ED SSA.....	CALL		

Panasonic

Lumix G Vario Mirrorless System Lenses

8/3.5 Fisheye.....	549.00
14/2.5 Aspherical.....	397.95
15/1.7 Aspherical Leica DG Summilux.....	597.99
20/1.7 II Aspherical.....	427.99
25/1.4 Aspherical Leica DG Summilux.....	597.99
42.5/1.2 Aspherical Power OIS Leica DG Nocticron.....	1,597.99
45/2.8 Aspherical Mega OIS Leica DG Macro-Elmarit.....	897.99
7-14/4.0 Aspherical.....	949.95
12-32/3.5-5.6 Aspherical.....	347.99
12-35/2.8 X Aspherical.....	997.99
35-100/2.8.....	1,497.99
14-42/3.5-5.6 Aspherical Mega OIS.....	164.95
14-42/3.5-5.6 X PZ Power OIS (Silver).....	316.00
14-45/3.5-5.6 Aspherical Mega OIS.....	289.00
14-140/4.0-5.8 HD Aspherical Mega OIS.....	399.00
14-140/3.5-5.6 Aspherical Power OIS.....	559.00
45-150/4.5-5.6 Aspherical.....	249.00
45-175/4.5-5.6 OIS.....	379.00
45-200/4.5-5.6 OIS.....	269.00
100-300/4.0-5.6 OIS.....	597.99

OLYMPUS

Flash System

FL-300R Flash.....	136.95	FL-600R Flash.....	299.95
FL-50R Flash.....			499.95
RF-11 Ring Flash.....	249.95	TF-22 Twin Flash.....	449.95
SRF-11 Ring Set.....	559.95	STF-22 Twin Flash Set.....	739.95

M.Zuiko Micro 4/3 Mirrorless Lenses

9mm f/8.0 Fisheye Body Cap Lens.....	99.00
15mm f/8.0 Fisheye Body Cap Lens.....	49.00
12/2.0 (46e).....	799.00
17/2.8 (37e).....	299.00
17/1.8 (46e).....	499.00
25/1.8 (46e).....	399.00
45/1.8 (37e).....	399.00
60/2.8 Mac ED (46e).....	499.00
75/1.8 ED (58e).....	899.00
75-300/4.8-6.7 II ED (58e).....	549.00
9-18/4.0-5.6 (52e).....	699.00
12-40/2.8 Pro ED (62e).....	999.00
12-50/3.5-6.3 ED EZ (52e).....	499.00
14-42/3.5-5.6 ED EZ (37e).....	349.00
14-42/3.5-5.6 II R (37e).....	299.00
14-150/4.5-6.7 (58e).....	599.00
40-150/4.5-6.7 ED R (58e).....	199.00

PENTAX

AF Flash System

AF-360FGZ.....		AF-540FGZ II.....	
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DA Digital AF Lenses

15/4.0 ED AL HD Limited (49e).....		70/2.4 HD Limited (49e).....	
14/2.8 ED IF (77e).....		200/2.8 ED IF SDM.....	
21/3.2 AL Limited (49e).....		300/4.0 ED IF SDM (77e).....	
35/2.4 AL (49e).....		560/5.6 ED AW (112e).....	
40/2.8 Limited (49e).....		50/2.8 Mac (55e).....	
35/2.8 Macro HD Limited (49e).....		12-24/4 ED AL IF (77e).....	
40/2.8 HD Limited (49e).....		16-50/2.8 ED AL SDM (77e).....	
50/1.8 (52e).....		17-70/4.0 AL IF SDM (67e).....	
55/1.4 SDM (58e).....		18-55/3.5-5.6 AL WR (52e).....	
18-135/3.5-5.6 ED AL (IF) DC WR (62e).....			
18-270/3.5-6.3 ED SDM (62e).....			
20-40/2.8-4 HD Limited ED DC WR (55e).....			
50-135/2.8 ED SDM (67e).....		55-300/4.5-8 HD ED WR (58e).....	
50-200/4.5-6.7 ED WR (52e).....		60-250/4.0 ED IF SDM (67e).....	

"FA" AF Lenses for 35mm & Digital SLRs

31/1.8 Limited.....		50/1.4 (49e).....	
35/2.4 AL (49e).....		50/2.8 Macro (52e).....	
43/1.9 Limited (49e).....		77/1.8 Limited (49e).....	
100/2.8 D FA WR Macro (49e).....			

Nikon

Nikon 1 Mirrorless Lenses

10/2.8 AW.....	196.95	10-30/3.5-5.6 VR PD.....	296.95
10/2.8.....	246.95	10-100/4.0-5.6 VR.....	546.95
18.5/1.8.....	186.95	11-27.5/3.5-5.6 AW.....	146.95
32/1.2.....	896.95	11-27.5/3.5-5.6.....	186.95
6.7-13/3.5-5.6 VR.....	496.95	30-110/3.5-5.6 VR.....	246.95
10-30/3.5-5.6 VR.....	186.95	70-300/4.5-5.6 VR.....	996.95

SONY

Flash System

HVL-F20M.....	149.99	HVL-F43M.....	398.00
HVL-F20S.....	149.99	HVL-F60M.....	548.00

E-Mount Mirrorless Lenses

16/2.8 (49e).....	248.00	10-18/4 OSS (62e).....	848.00
20/2.8 (49e).....	348.00	16-50/3.5-5.6 OSS (40.5e).....	348.00
24/1.8 (49e).....	1,098.00	16-70/4.0 ZA OSS (55e).....	998.00
30/3.5 Mac (49e).....	278.00	18-55/3.5-5.6 (49e).....	298.00
35/1.8 OSS (49e).....	448.00	18-105/4 G OSS (72e).....	598.00
35/2.8 ZA (49e).....	798.00	18-200/3.5-6.3 (67e).....	898.00
50/1.8 OSS (49e).....	298.00	18-200/3.5-6.3 OSS (62e).....	1,198.00
55/1.8 ZA FE (49e).....	998.00	55-210/4.5-6.3 OSS (49e).....	348.00
18-200/3.5-6.3 PZ OSS (67e).....		28-70/3.5-5.6 OSS (55e).....	1,498.00
24-70/4.0 ZA OSS (67e).....	1,198.00		
28-70/3.5-5.6 OSS (55e).....	498.00		

Digital Lenses

16/2.8 Fish-eye.....	998.00	11-18/4.5-5.6 DT (77e).....	798.00
20/2.8 (72e).....	748.00	16-35/2.8 ZA SSM (77e).....	1,998.00
24/2.8 Carl Zeiss (72e).....	1,398.00	16-50/2.8 DT (40.5e).....	798.00
30/2.8 DT Macro (49e).....	198.00	16-80/3.5-4.5 DT (62e).....	998.00
35/1.4 G (55e).....	1,498.00	16-105/4.5-6.7 DT (62e).....	698.00
35/1.8 DT (55e).....	218.00	18-55/3.5 DT SAM II (55e).....	218.00
50/1.8 DT (49e).....	168.00	18-135/3.5-5.6 (62e).....	498.00
50/1.4 (55e).....	448.00	18-250/3.5-6.3 DT (62e).....	648.00
50/1.4 Carl Zeiss ZA (72e).....	1,498.00	24-70/2.8 Carl Zeiss (77e).....	1,998.00
50/2.8 Mac (55e).....	598.00	28-75/2.8 (67e).....	898.00
85/2.8 (55e).....	298.00	55-200/4.0-5.6 DT (55e).....	198.00
85/1.4 Carl Zeiss (72e).....	1,698.00	55-300/4.5-5.6 DT (62e).....	298.00
100/2.8 Macro (55e).....	798.00	70-200/2.8 G SSM II (77e).....	2,998.00
135/1.8 Carl Zeiss (77e).....	1,798.00	70-300/4.5-5.6 G (62e).....	998.00
135/2.8 STF (72e).....	1,398.00	70-400/4.5-5.6 G2.....	2,198.00
300/2.8 G APO II (42eR).....	7,498.99	1.4x Teleconverter.....	548.00
500/4 G (42eR).....	12,998.00	2x Teleconverter.....	548.00

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16
MP**Panasonic. Lumix DMC-GM5**

Mirrorless Camera

- Highly Compact Magnesium Alloy Body
- Micro 4/3 System • Built-in Wi-Fi
- SDHC/SDXC Card Slot • 3.0" LCD
- Full HD 1080p Video at 60 fps
- MEGA O.I.S. • Available in Black or Red

with 12-32mm Lens #PADMCGM5K*

16
MP**Panasonic. Lumix DMC-GX7**

Mirrorless Camera

- Micro 4/3 System
- 3" Tilting Touchscreen LCD
- SDHC/XC Card Slot • 90° Tilting EVF
- Full HD 1080p AVCHD Video at 60 fps
- Available in Black or Silver

with 14-42mm II Lens #PADMCGX7K*



4K

Panasonic. Lumix DMC-GH4

4K Mirrorless Camera

- DCI 4K 4096x2160 at 24p
- Full HD up to 60p • 3.0" LCD
- UHD 4K 3840x2160 at 30p/24p
- Support for 59.94p, 23.98p, 50p, & 24p
- Magnesium Alloy, Weather-Sealed Body

Body Only #PADMCGH4*

23
MP**PENTAX K-3**

DSLR Camera

- 3.2" LCD • 8.3 fps Shooting
- Pentax K Lens Mount • Dual SD Card Slots
- In-Camera Shake Reduction Stabilization
- Full HD 1080i/p Video Recording
- Weather-Sealed Magnesium Alloy Body

Body Only #PEK3

24
MP**SONY Alpha A6000**

Mirrorless Camera

- Uses Sony E-mount Lenses
- SD/XC, MS Pro Duo/HG Duo Card Slot
- Up to 11 fps Shooting • 3.0" Tilting LCD
- Full HD 1080i/p AVCHD Video at 24/60 fps
- Built-In Wi-Fi • Available in Black or Silver

Kit with 16-50mm OSS Lens #SOA6000*

24
MP**SONY Alpha A7 II**

Mirrorless Camera

- Full Frame Exmor CMOS Sensor
- 3.0" Tiltable LCD • Full HD XAVC S Video
- SDHC/XC, MS Pro Duo/HG Duo Card Slot
- Uses Sony E-mount Lenses • Built-In Wi-Fi
- Weather-Resistant Magnesium Alloy Body

Body Only #SOA72

Kit with 28-70mm OSS Lens #SOA72K

20
MP**SONY Alpha SLT-A58**

DSLR Camera

- Uses Sony E-mount Lenses
- SDHC/XC, MS Pro Duo/HG Duo Card Slot
- Full HD 1080i/p Video • 2.7" Tilting LCD
- SteadyShot INSIDE Image Stabilization
- ISO 100-16000 with Noise Reduction

DT 18-55mm SAM II Lens #SOSLTA58K

24
MP**SONY a77 II**

DSLR Camera

- 3.0" 3-Way Tilting LCD • 12fps Shooting
- Uses Sony E-mount Lenses
- Full HD 1080p Video Recording at 60 fps
- SDHC/XC, MS Pro Duo, MS PRO HG Duo, XC-HG Duo Card Slot • Built-In Wi-Fi

Body Only #SOA772

H HSM Model with Canon, Nikon, Sigma
R Rear Slip-in Gelatin Filter Slot**ZEISS**

These fully-compatible lenses
with autofocus expand the
capabilities of both the Sony NEX
and Fujifilm X camera systems
with outstanding optical quality.

Touti Mirrorless Lenses	Fujifilm X	Sony NEX	Price
12mm f/2.8 (67ø)	#ZET2812X	#ZET2812E	999.00
32mm f/1.8 (52ø)	#ZET1832X	#ZET1832E	720.00
50mm f/2.8M (52ø)	#ZET5028MX	#ZET5028ME	999.00

Tokina

DX — for Digital SLRs Only

FX — Designed for full frame DSLRs

	Canon EOS	Nikon AF	Rebate	Price
FX 100mm f/2.8 Pro D Macro (52ø)	#T010028PCAF	#T010028PNAF	—	379.00
DX 10-17mm f/3.5-4.5 ATX Fisheye	#T0101735CAF	#T0101735NAF	—	549.00
DX 11-16mm f/2.8 Pro II (77ø)	#T0111628PCL	#T0111628PNL	\$30	449.00 ^A
DX 11-20mm f/2.8 Pro (82ø)	#T0112028PDXC	#T0112028PDNX	—	599.00
DX 12-28mm f/4.0 Pro (77ø)	#T012284DXC	#T012284DXN	—	449.00
FX 16-28mm f/2.8 Pro	#T01628FXC	#T01628FXN	\$40	589.00 ^A
FX 17-35mm f/4 Pro (82ø)	#T01735F4FXC	#T01735F4FXN	—	449.00

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Di for both digital and film SLR cameras Di-II for digital SLRs Only Di-III for mirrorless cameras Only

C = Canon N = Nikon P = Pentax SA = Sony Alpha SE = Sony E Mount

	SKU #	Mounts	Rebate	Price
Di-II 60mm f/2.0 LD IF Macro (55ø)	#TA602DI*	C, N, SA	—	524.00
Di 90mm f/2.8 Macro (55ø)	#TA9028M*	C, N, P, SA	—	499.00
Di 90mm f/2.8 SP Macro VC USD (58ø)	#TA9028VC*	C, N, S	—	749.00
Di 180mm f/3.5 LD IF Macro (72ø)	#TA18035*	C, N, SA	—	739.00
Di-II 10-24/3.5-4.5 (77ø)	#TA102435*	C, N, P, SA	—	499.00
Di-II 16-300/3.5-6.3 VC PZD (67ø)	#TA1630035DI*	C, N, SA	\$50	579.00**
Di-II 17-50/2.8 XR LD IF Asph (67ø)	#TA175028*	C, N, P, SA	—	499.00
Di-II 17-50/2.8 XR VC LD IF Asph. (67ø)	#TA175028*Q	C, N	—	649.00
Di-II 18-200/3.5-6.3 (62ø)	#TA1820035*	C, N, P, SA	—	199.00
Di-III 18-200/3.5-6.3 VC (62ø)	#TA1820035S*	SE Black or Silver	—	739.00
Di-II 18-270/3.5-6.3 VC PZD (62ø)	#TA18270*	C, N, SA	\$100	349.00**
Di 24-70/2.8 VC USD (82ø)	#TA247028*	C, N, SA	\$100	1,199.00**
Di 28-75/2.8 XR (67ø)	#TA287528*	C, N, P, SA	—	499.00
Di 28-300/3.5-6.3 XR LD (62ø)	#TA2830035XD*	C, P, SA	—	399.00
Di 28-300/3.5-6.3 VC PZD (67ø)	#TA2830035DI*	C, N, SA	—	849.00
Di 70-200/2.8 LD IF Macro (77ø)	#TA7020028M*	C, N, P, SA	—	769.00
Di 70-200/2.8 SP VC USD (77ø)	#TA7020028*	C, N, SA	\$100	1,399.00**
Di 70-300/4-5.6 LD Macro (62ø)	#TA70300M*	C, N, P, SA	—	199.00
Di 70-300/4-5.6 VC USD (62ø)	#TA70300*	C, N, SA	\$100	349.00**
Di 150-600/5-6.3 VC USD (95ø)	#TA150600S*	C, N, SA	—	1,069.00
1.4x SP AF Pro Teleconverter	#TA14XP*	C, N	—	224.00
2x SP AF Pro Teleconverter	#TA2XP*	C, N	—	254.00

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C = Canon MFT = Micro 4/3 N = Nikon O = Olympus P = Pentax SI = Sigma SA = Sony Alpha SE = Sony E

** Price After Rebate Rebates Expire 6-30-15

	Mount	SKU #	Rebate	Price
DC 4.5mm f/2.8 EX Circular Fisheye HSM R	C, N, P, SI, SA	#SI4528EX*	—	899.00
DG 8mm f/3.5 EX Circular Fisheye R	C, N, SI, SA	#SI835*	\$50	849.00**
DC 10mm f/2.8 EX Fisheye HSM R	C, N, SA	#SI1028EXDC*	—	649.00
DG 15mm f/2.8 EX Diagonal Fisheye R	C, N, P, SA	#SI1528DG*	—	609.00
DN 19mm f/2.8 (46ø) Black or Silver	MFT, SE	#SI1928DN*	—	199.00
DG 20mm f/1.8 EX DF RF Aspherical (82ø)	N	#SI2018*	—	549.00
DG 24mm f/1.8 EX DF Asph. Macro (77ø)	C	#SI2418MCAF	—	499.00
DG 28mm f/1.8 EX DF Asph. Macro (77ø)	C	#SI2818MCAF	—	449.00
DN 30mm f/2.8 (46ø) Black or Silver	MFT, SE	#SI3028DN*	—	199.00
DC 30mm f/1.4 HSM (62ø)	C, N, P, SI, SA	#SI3014DCHSM*	—	499.00
DG 35mm f/1.4 HSM (67ø)	C, N, P, SI, SA	#SI3514*	—	899.00
DG 50mm f/1.4 EX HSM (77ø) *	C, N, SA	#SI5014*	\$100	999.00**
DG 50mm f/1.4 HSM (77ø) *	C, N, SI, SA	#SI5014A*	—	349.00
DG 50mm f/2.8 EX Macro (55ø)	C, N	#SI5028MDG*	—	349.00
DN 60mm f/2.8 (46ø) Black or Silver	MFT, SE	#SI6028DN*	\$30	209.00**
DG 70mm f/2.8 EX Macro (62ø)	N, P	#SI7028MDG*	—	449.00
DG 85mm f/1.4 EX HSM (77ø)	C, N, P, SI, SA	#SI8514*	—	969.00
DG 105mm f/2.8 EX Macro OS HSM (62ø)	C, N, SI, SA	#SI10528MDG*	\$300	669.00**
DG 150mm f/2.8 EX APO Macro OS HSM (72ø)	C, N, SI, SA	#SI15028APO*	—	1,099.00
DG 180mm f/2.8 EX APO Macro OS HSM (86ø)	C, N, SI, SA	#SI18028AMEO*	—	1,699.00
DG 300mm f/2.8 EX APO EX HSM (46ø Rear)	C, N, P, SI, SA	#SI30028DG*	—	3,399.00
DG 500mm f/4.5 APO EX HSM (46ø Rear)	C, N, P, SI, SA	#SI50045DG*	—	4,999.00
DC 8-16mm f/4.5-5.6 HSM	C, N, S	#SI8164556*	—	699.00
DC 10-20mm f/4.5-5.6 EX HSM (77ø)	C, P, SI, SA	#SI102045D*	—	379.00
DC 10-20mm f/3.5 EX HSM (82ø)	C, N, P, SI, SA	#SI102035*	\$150	499.00**
DG 12-24mm f/4.5-5.6 EX Asph. HSM II	C, N, SI, SA	#SI122445*	—	949.00
DC 17-50mm f/2.8 EX OS HSM (77ø)	C, N, P, SI	#SI175028*	\$150	519.00**
DC 17-70mm f/2.8-4.0 OS Mac. HSM TSC (72ø)	C, N, P, SI, SA	#SI177028A*	—	499.00
DC 18-35mm f/1.8 HSM (72ø)	C, N, P, SI, SA	#SI183518DC*	—	799.00
DC 18-200mm f/3.5-6.3 OS II HSM (72ø)	SI, SA	#SI1820035*	—	299.00
DC 18-200mm f/3.5-6.3 OS Macro HSM (62ø)	C, N, P, SI, SA	#SI1820035D*	—	399.00
DC 18-250mm f/3.5-6.3 OS Macro HSM (62ø)	C, N, P, SI, SA	#SI1825035M*	\$200	349.00**
DC 18-300mm f/3.5-6.3 OS Macro HSM (72ø)	C, N, P, SI, SA	#SI1830035*	—	579.00
DG 24-70mm f/2.8 EX IF HSM (82ø)	C, N, SI, SA	#SI247028*	\$100	799.00**
DG 24-105mm f/4.0 OS HSM (82ø)	C, N, SI, SA	#SI24105*	—	899.00
DG 50-500mm f/4.5-6.3 APO OS HSM (95ø)	C, N, P, SI, SA	#SI505004563*	\$150	1,509.00**
DG 70-200mm f/2.8 EX APO OS HSM (77ø)	C, N, P, SI, SA	#SI7020028*	\$200	1,199.00**
DG 70-300mm f/4-5.6 Macro (58ø)	C, N, P, SI, SA	#SI703004*	—	169.00
DG 70-300mm f/4-5.6 APO Macro (58ø)	C, N, P, SI, SA	#SI703004DG*	—	179.00
DG 120-300mm f/2.8 OS HSM (105ø)	C, N, S	#SI120300*	—	3,599.00
DG 120-400mm f/4.5-5.6 APO OS HSM (77øR)	C, P, SI	#SI120400*	—	899.00
DG 150-500mm f/5-6.3 APO OS HSM (86ø)	C, N, P, SI, SA	#SI150500*	—	1,069.00
DG 1.4x EX APO Tele-Converter	C, N, S	#SI14XDG*	—	249.00
DG 2x EX APO Tele-Converter	C, N, S	#SI2XDG*	—	299.00
DG FLASH EF-610 ST	C, N, P, SI, SA	#SIEF610ST*	\$30	135.00**
DG FLASH EF-610 Super	C, N, P, SI, SA	#SIEF610*	\$30	225.00**
DG FLASH EM-140 TTL Ringlight	C, N, P, SI, SA	#SIEM140DG*	\$30	349.00**



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24 MP

Rebates Expire 7-4-15

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- STM Lens Support for Quiet AF in Movies • Creative Filters
- Full HD 1080p Video Recording • 5 fps Shooting

T6i Kit	T6s Kit	T5i Kit	T5 Kit
with 18-55mm IS STM Lens	with 18-135mm IS STM Lens	with 18-55mm IS STM Lens	with 18-55mm IS II Lens
#CAEDRT6I1855	#CAEDRT6SK1	#CAEDRT5IK	#CAEDRT5K
\$899.99	\$1199.00	\$799.99	\$549.99
-\$50 Rebate	-\$50 Rebate	-\$150 Rebate	-\$100 Rebate
\$849.99	\$1,149.00	\$649.99	\$449.99



\$200 REBATE!
20 MP

Rebates Expire 7-4-15

Canon EOS-70D DSLR Camera

- Dual Pixel CMOS AF with Live View
- SDHC/XC Card Slot • Uses Canon EF & EF-S Lenses
- 3.0" Vari-Angle Touchscreen • 7 fps Continuous Shooting
- Built-In Wireless • Full HD 1080p Video

EOS-70D	EOS-70D Kit	EOS-60D	EOS-60D Kit
Body Only	with 18-55mm STM Lens	Body Only	with 18-135mm IS Lens
#CAE70D	#CAE70D1855	#CAE60D	#CAE60D18135
\$1,199.00	\$1,349.00	—	—
-\$200 Rebate	-\$200 Rebate	—	—
\$999.00	\$1,149.00	—	—



\$100 REBATE!
20 MP

Rebates Expire 7-4-15

Canon EOS-7D Mark II DSLR Camera

- 3" Clear View II LCD • Native ISO 16000 • 10 fps Shooting
- Dual Pixel CMOS AF with Live View • Dual CF & SDHC/XC Card Slots
- Full HD 1080p/60 Video & Movie Servo AF
- Built-In GPS Receiver & Digital Compass

EOS-7D mII	EOS-7D	EOS-7D Kit	EOS-7D Kit
Body Only	Body Only	with 18-135mm IS Lens	with 28-135mm IS Lens
#CAE7D2	#CAE7D	#CAE7D18135	#CAE7D28135
\$1,799.00	—	—	—
-\$100 Rebate	—	—	—
\$1,699.00	—	—	—



\$300 REBATE!
20 MP

Rebates Expire 7-4-15

Canon EOS-6D DSLR Camera

- Full-Frame CMOS Sensor • 3.0" LCD
- Uses Canon EF Lenses • SDHC/XC Card Slot
- Full HD 1080p with Manual Controls • Built-In Wi-Fi
- ISO 50-102400 • Built-In HDR & Multiple Exposure Modes

EOS-6D	EOS-6D Kit
Body Only	with 24-105mm f/4 L IS Lens
#CAE6D	#CAE6D24105
\$1,699.00	\$2,299.00
-\$300 Rebate	-\$300 Rebate
\$1,399.00	\$1,999.00



\$300 REBATE!
22 MP

Rebates Expire 7-4-15

Canon EOS-5D Mark III DSLR Camera

- 3.2" LCD • DIGIC 5+ Image Processor
- Uses Canon EF Lenses • Dual CF, SD Card Slots
- Full HD 1080/30p & 720/60p Formats
- Built-In HDR & Multiple Exposure Modes • ISO 50-102400

EOS-5D Mark III	EOS-5D Mark III Kit
Body Only	with 24-105mm f/4 L IS Lens
#CAE5D3	#CAE5D324105
\$2,799.00	\$3,399.00
-\$300 Rebate	-\$300 Rebate
\$2,499.00	\$3,099.00



\$700 REBATE!
18 MP

Rebates Expire 7-4-15

Canon EOS-1Dx DSLR Camera

- Dual DIGIC 5+ Image Processors • 3.2" LCD
- Magnesium Alloy Body • 1920 x 1080 HD Video Capture
- Uses Canon EF Lenses • Dual CF card slots
- Eye-Level Pentaprism Viewfinder
- Live View Still & Video Recording
- 61-Point High Density Auto Focus

EOS-1Dx	
Body Only	#CAE1DX.....\$5,999.00
	Less \$700 Rebate.....Final \$5,299.00

Canon SLR Lenses & Flashes

Call for Current Rebates & Promotions

Rebates Expire 5-30-15

EOS Flash System	MAP	Instant Rebate	Final
270EX II	169.99	\$30	139.99
320EX			
430EX II	299.99	\$40	259.99
600EX-RT	549.99	\$50	499.95
MR-14EX II Ringlight	549.99	\$50	499.99
MT-24EX Twin Flash	829.99	\$60	769.99

EF-S Digital Lenses	MAP	Instant Rebate	Final
(Not compatible with full frame cameras)			
24/2.8 STM (52ø)	149.99		
60/2.8 USM Macro (52ø)	469.99	\$50	419.99
10-18/4.5-5.6 IS STM (67ø)	299.00	\$50	249.00
10-22/3.5-4.5 USM (77ø)	649.99	\$50	599.99
15-85/3.5-5.6 IS USM (72ø)	799.99		
17-55/2.8 IS USM (67ø)	879.99	\$50	829.99
17-85/4-5.6 IS USM (67ø)		CALL	
18-55/3.5-5.6 IS (58ø) II	199.99		
18-135/3.5-5.6 IS (67ø)	499.99		
18-200/3.5-5.6 IS (72ø)	699.99		
55-250/4-5.6 IS USM II (58ø)	249.99		
55-250/4-5.6 IS STM II (58ø)	299.99		

TSE MF Lenses	MAP	Instant Rebate	Final
17/4.0 L	2,149.00		
24/3.5 L II	1,899.00		
45/2.8	1,399.00		
90/2.8	1,399.00		

EF Lenses	MAP	Instant Rebate	Final
20/2.8 USM (72ø)	539.99	\$50	489.99
24/2.8 IS USM (58ø)	599.99	\$50	549.99
28/1.8 USM (58ø)	509.99	\$60	449.99
28/2.8 IS USM (58ø)	549.99	\$50	499.99
35/2 IS USM (67ø)	599.99	\$50	549.99
40/2.8 STM Pancake (52ø)	199.99	\$50	149.99
50/1.8 II (52ø)	125.99		
50/2.5 Macro (52ø)	299.99		
50/1.4 USM (58ø)	399.99	\$70	329.99
MP-E 65/2.8 1x-5x Macro (58ø)	1,049.00		
85/1.8 USM (58ø)	419.99	\$70	349.99
100/2 USM (58ø)	499.99	\$50	449.99
100/2.8 USM Macro (58ø)	599.99	\$50	549.99
400/4.0 DO IS II USM (52ø)	6,899.00		
24-105/3.5-5.6 IS STM (77ø)	599.00		
28-135/3.5-5.6 IS USM (72ø)		CALL	
70-300/4-5.6 IS USM (58ø)	649.99		
70-300/4.5-5.6 DO IS USM (58ø)	1,399.00		
75-300/4.0-5.6 III (58ø)	199.99		
75-300/4.0-5.6 III USM (58ø)	234.99		

EF "L" Lenses	MAP	Mail-in Rebate	Final
14/2.8 USM II	2,099.00		
24/1.4 II (77ø)	1,549.00		
35/1.4 USM (72ø)	1,479.00	\$150	1,329.00
50/1.2 USM (72ø)	1,449.00	\$50	1,399.00
85/1.2 USM II (72ø)	1,999.00	\$50	1,949.00
100/2.8 IS USM Macro (67ø)	899.99	\$50	849.00

EF "L" Lenses	MAP	Mail-in Rebate	Final
135/2.0 USM (72ø)	999.00	\$50	949.00
180/3.5 USM Macro (72ø)	1,399.00		
200/2.8 USM II (72ø)	749.00		
200/2.0 IS USM (52ø)	5,699.00		
300/4.0 IS USM (77ø)	1,349.00		
300/2.8 IS USM II (52ø rear)	6,099.00		
400/5.6 USM (77ø)	1,249.00		
400/2.8 IS II (52ø rear)	9,999.00		
500/4 IS USM II (52ø rear)	8,999.00		
600/4.0 IS II (52ø rear)	11,499.00		
8-15/4.0 Fish-eye USM	1,249.00		
11-24/4 USM	2,999.00		
16-35/4 USM (77ø)	1,099.00	\$100	999.00
16-35/2.8 USM II (82ø)	1,599.00	\$100	1,499.00
17-40/4.0 USM (77ø)	799.99	\$100	699.00
24-70/4.0 IS USM (77ø)	999.99	\$200	799.00
24-70/2.8 IS USM (82ø)	1,899.00	\$100	1,799.00
24-105/4 IS USM (77ø)	999.99		
28-300/3.5-5.6 IS USM (77ø)	2,449.00		
70-200/4.0 USM (67ø)	649.99		
70-200/4.0 IS USM (77ø)	1,199.00	\$100	1,099.00
70-200/2.8 USM (77ø)	1,349.00		
70-200/2.8 IS II USM (77ø)	2,099.00	\$100	1,999.00
70-300/4.0-5.6 IS USM (67ø)	1,349.00		
100-400/4.5-5.6 IS USM (77ø)	1,699.00		

EF Teleconverters	MAP	Mail-in Rebate	Final
1.4x III	429.99		
2x III	429.99		

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**Nikon D3300** DSLR Camera

- EXPEED 4 Image Processor • Full HD 1080p Video
- 3.0" LCD • 5 fps Shooting • SD/SDHC/SDXC Card Slot
- Uses Nikon AF Lenses (1.5x factor) • Easy Panorama Mode and Guide Mode • Nikon Inc. limited warranty included

D3300 Kit	D3200 Kit
Black, Grey or Red with 18-55mm VR II Lens #NID33001855*	Black or Red with 18-55mm VR Lens #NID32001855*
\$646.95	\$529.95
-\$150 Rebate	-\$80 Rebate
\$496.95	\$449.95

**Nikon D5500** DSLR Camera

- EXPEED 4 Image Processor • Full HD 1080p Video at 60 fps
- Uses Nikon AF Lenses (1.5x factor) • SDHC/XC Card Slot
- 3.2" Vari-Angle Touchscreen • Built-In Wi-Fi
- ISO 100-25600 • Nikon Inc. limited warranty included

D5500 Kit	D5300 Kit	D5200 Kit
Black or Red with 18-55mm VR II #NID55001855*	Black or Grey with 18-55mm VR II #NID53001855*	Black only with 18-55mm VR #NID52001855*
\$999.95	\$896.95	\$599.95
-\$150 Rebate	-\$150 Rebate	-\$50 Rebate
\$849.95	\$746.95	\$549.95

**Nikon D7200** DSLR Camera

- No Optical Low-Pass Filter • Dual SDHC/XC Card Slots
- EXPEED 4 Image Processor • Full HD 1080p Video
- Accepts Nikon AF Lenses (1.5x factor) • 3.2" LCD
- Built-In Wi-Fi • Nikon Inc. limited warranty included

D7200	D7200 Kit	D7100	D7100 Kit
Body Only	with 18-140mm VR DX Lens	Body Only	with 18-140mm VR DX Lens
#NID7200	#NID720018140	#NID7100	#NID710018140
—	\$1,699.95	\$1,199.95	\$1,696.95
—	-\$200 Rebate	-\$300 Rebate	-\$500 Rebate
\$1,199.95	\$1,499.95	\$899.95	\$1,196.95

**Nikon D750** DSLR Camera

- FX-Format (Full-Frame) CMOS Sensor • 3.2" Tilting LCD
- Uses Nikon AF Lenses • Full HD 1080p Video at 60 fps
- EXPEED 4 Image Processor • Built-In Wi-Fi Connectivity
- SDHC/XC Card Slot • Nikon Inc. limited warranty included

D750	D750 Kit	D610	D610 Kit
Body Only	with 24-120mm VR Lens	Body Only	with 24-85mm VR Lens
#NID750	#NID75024120	#NID610	#NID6102485
\$2,296.95	\$3,596.95	\$1,996.95	\$2,596.95
-\$300 Rebate	-\$900 Rebate	-\$500 Rebate	-\$600 Rebate
\$1,996.95	\$2,696.95	\$1,496.95	\$1,996.95

**Nikon D810** DSLR Camera

- FX-Format CMOS Sensor • EXPEED 4 Image Processor
- Uses Nikon AF Lenses • 3.2" LCD • Optical Low-Pass Filter
- CF & SD Dual Card Slots • Full HD 1080p Video at 60/30/24 fps • Nikon Inc. limited warranty included

D810	D810 Kit
Body Only	with 24-120mm VR Lens
#NID810*	#NID81024120*
\$3,296.95	\$4,599.95
-\$300 Rebate	-\$900 Rebate
\$2,996.95	\$3,699.95

**Nikon D4s** DSLR Camera

- FX-format (full-frame) CMOS Sensor
- CF Type 1 & XQD Compatible • 3.2" LCD
- Full HD 1080p Video at 60 fps
- EXPEED 4 Image Processor
- 14-Bit RAW Files & 12-Bit RAW S Format
- 11 fps Shooting for 200 Shots with AE/AF
- Nikon Inc. limited warranty included

D4s
Body Only
#NID4S \$6,496.95
Less \$500 Rebate.....Final \$5,996.95

Nikon. SLR Lenses & Flashes

Call for Current Rebates & Promotions

Rebates Expire 5-30-15

AF Flashes	Price	Rebate	Final
SB-300	146.95		
SB-500	246.95	\$20	269.95
SB-700	326.95	\$30	296.95
SB-910	546.95	\$50	496.95
R1 Wireless Twin Flash			
R1C1 Wireless Twin Flash System			

DX ED-IF Lenses for Digital Only	Price	Rebate	Final
10.5/2.8 Fish-Eye	774.95		
35/1.8 G AF-S (52ø)	196.95		
40/2.8 G AF-S Micro (52ø)	276.95	\$30	246.95
85/3.5 G ED VR Micro	526.95	\$100	426.95
10-24/3.5-4.5 G AF-S (77ø)	899.95		
12-24/4 G AF-S (77ø)	1,224.95		
16-85/3.5-5.6 G AF-S VR (67ø)	699.95		
17-55/2.8 G AF-S (77ø)	1,539.95	\$140	1,399.95
18-55/3.5-5.6 G AF-S II (52ø)	119.95		
18-55/3.5-5.6 G AF-S VR (52ø)	196.95		
18-55/3.5-5.6 G AF-S VR II (52ø)	246.95		
18-105/3.5-5.6 G AF-S VR	396.95		
18-140/3.5-5.6 G AF-S VR **	496.95	\$200	296.95**
18-200/3.5-5.6 G AF-S VR II	596.95		
18-300/3.5-5.6 G AF-S ED VR (77ø)	996.95		
18-300/3.5-6.3 G AF-S ED VR (67ø)	896.95	\$100	796.95
55-200/4-5.6 G AF-S (52ø)			
55-200/4-5.6 G AF-S VR II	346.95	\$200	146.95
55-300/4.5-5.6 G AF-S VR	396.95	\$150	246.95

D-Type AF Lenses	Price	Rebate	Final
14/2.8 D ED	1,894.95		
16/2.8 D (39ø) with Hood	999.95		
20/2.8 D (62ø)	624.95		
20/1.8 G AF-S ED (77ø)	796.95		
24/2.8 D (52ø)	394.95	\$50	344.95
24/1.4 G AF-S ED (77ø)	2,199.95		
24/3.5 D ED PC-E (77ø)	2,199.95		
28/1.8 G AF-S (67ø)	696.95		
28/2.8 D (52ø)	289.95	\$40	249.95
35/2.0 D (52ø)	389.95		
35/1.4 G AF-S ED (67ø)	1,799.95	\$200	1,599.95
35/1.8 G AF-S ED (58ø)	596.95		
45/2.8 D ED PC-E Micro (77ø)	2,049.95		
50/1.8 D (52ø)	134.95		
50/1.8 G AF-S (58ø)	216.95		
50/1.4 D (52ø)			
50/1.4 G AF-S (58ø)	484.95	\$50	434.95
58/1.4 G AF-S (72ø)	1,696.95	\$200	1,496.95
60/2.8 D Micro (62ø) (1:1)	519.95		
60/2.8 G AF-S ED Micro (62ø)	599.95	\$100	499.95
85/1.8 G AF-S (67ø)	496.95		
85/1.4 G AF-S (77ø)	1,699.95		
85/2.8 PC-E Micro (77ø)	1,979.95		
105/2.8 G AF-S ED-IF VR Micro (62ø)	984.95	\$135	849.95
105/2.0 DC D with Hood (72ø)	1,199.95		
180/2.8 D ED-IF (72ø)	1,004.95		
200/4 D ED-IF Micro with Case (62ø)	1,794.95		
200/2 G AF-S ED-IF VR II (52ø)	5,999.95		
300/4.0 D AF-S ED-IF (77ø)			

D-Type AF Lenses	Price	Rebate	Final
300/2.8 G AF-S VR (52ø-R)	5,899.95		
500/4.0 G AF-S VR ED (52ø)			
600/4.0 G AF-S VR ED (52ø)			
14-24/2.8 G AF-S ED-IF	1,996.95		
16-35/4.0 G AF-S ED VR (77ø)	1,256.95		
17-35/2.8 D AF-S ED-IF (77ø)	1,954.95		
18-35/3.5-4.5 AF-S G ED (77ø)	746.95		
24-70/2.8 G AF-S ED-IF (77ø)	1,886.95	\$200	1,686.95*
24-85/2.8-4.0 D IF (72ø)	744.95		
24-85/3.5-4.5 G AF-S ED VR	596.95	\$100	496.95
24-120/4.0 G AF-S ED VR (77ø)	1,296.95		
28-300/3.5-5.6 G AF-S ED VR	1,046.95	\$250	796.95^
70-200/4.0 G AF-S ED VR (67ø)	1,396.95		
70-200/2.8 G AF-S ED-IF VR II (77ø)	2,396.95	\$300	2,096.95*
70-300/4.0-5.6 G (62ø)	172.95		
70-300/4.5-5.6 G AF-S VR	586.95	\$200	386.95
80-200/2.8 D with Collar (77ø)	1,224.95		
80-400/4.5-5.6 G AF-S ED VR (77ø)	2,696.95		
200-400/4 G AF-S ED VR II (52ø)	6,999.95		

Teleconverters	Price	Rebate	Final
TC-14E III (1.4x) Teleconverter	499.95		
TC-17E II (1.7x) Teleconverter	549.95	\$50	499.95
TC-20E III (2x) Teleconverter	499.95	\$50	449.95

* When purchased with a D810, D4s

** When purchased with a D3300, D5300, D5500, D7100, D7200

^ When Purchased with D7100, D7200, D610, D750, Df, D810, D4s



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Canon Powershot G16

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- 5x Optical Zoom • 4x Digital Zoom
- 6.1-30.5mm f/1.8-2.8 (35mm equiv: 28-140mm) • SD/SDHC/SDXC Card Slot
- Enhanced Wi-Fi Capabilities

#CAPSG16.....\$499.99
Less \$100 Rebate.....Final \$399.99



Canon Powershot SX60 HS

- 65x Optical Zoom • RAW Image Capture
- 3.8-247mm f/3.4-6.5 (35mm equiv: 21-1365mm) • 3.0" Vari-Angle LCD
- SDHC/SDXC Card Slot • Built-In Wi-Fi
- Full HD 60p Video & External Mic Input

#CAPSSX60HSB.....\$549.99
Less \$70 Rebate.....Final \$479.99



FUJIFILM X30

- 3.0" Tilting LCD • Die-Cast Magnesium Body
- Full HD 1080 Video @60fps • EXR Processor II
- 4x Optical Zoom • Dual Manual Control Rings
- 7.1-28.4mm f/2-2.8 (35mm equiv: 28-112mm)
- SDHC/XC Card Slot • ISO 100-12800
- Classic Chrome Film Simulation Mode

Black or Silver #FUX30*



Nikon Coolpix L840

- 3.0" Tilting LCD • Built-In Wi-Fi
- 38x Optical Zoom • 76x Digital Zoom
- 4-152mm f/3-6.5 VR Lens (35mm equiv: 22.5-855mm) • SDHC/XC Card Slot
- Full HD 1080p Video at up to 30 fps

Black or Red #NICPL840*.....\$299.99
Less \$50 Rebate.....Final \$249.99

MEMORY CARDS

CF Compact Flash

	Delkin				Kingston		Lexar		Sandisk		
	500x	700x	1000x	1050x	Ultimate 266x	Ultimate 600x	800x	1066x	Ultra 50MBs	Extreme 120MBs	Extreme Pro 160MBs
16GB	29.95	34.95	39.95	—	18.95	—	38.80	39.95	20.95	37.95	49.95
32GB	34.95	39.95	59.95	79.95	28.95	44.95	51.97	68.95	32.99	49.95	65.95
64GB	68.50	72.50	86.99	149.95	49.95	79.95	78.80	118.69	—	69.89	129.95
128GB	—	159.99	209.95	238.99	—	—	177.95	178.99	—	164.99	236.00
256GB	—	—	—	—	—	—	359.90	469.95	—	—	529.99
512GB	—	—	—	—	—	—	749.95	—	—	—	—

SDHC-UHS1 Ultra High Speed

	Lexar	Sandisk	Sony
	Platinum 300x 633x	Extreme 80MBs 80MBs	Class 10 94MBs Micro
8GB	5.99	19.89	11.66 7.39
16GB	9.99 15.95^	22.49 24.95	18.00 —
32GB	14.99 28.95^	37.95 34.95	15.95 —

SDHC-UHS1 Speed Class 3 (U3)

	Delkin	Kingston	Lexar	Sandisk	Sony
	633x 90MBs	633x 95MBs	Extreme 60MBs 95MBs	Extm Pro 95MBs	Micro 95MBs
8GB	17.95	—	—	—	—
16GB	26.95 19.95	—	13.45	—	—
32GB	36.95 28.95	19.95	21.88 35.95	34.75 39.95	—

SDHC-UHS2

	Delkin	Lexar	Sandisk
	U3 280MBs	1000x 1000x 2000x 150MBs Micro 300MBs	Extm Pro 280MBs
8GB	64.95	14.95	—
16GB	114.95	28.95 39.95^ 58.99*	74.95

SDXC-UHS1 Ultra High Speed

	Lexar	Sandisk	Sony
	Platinum 300x 633x	Extreme 80MBs 80MBs	Class 10 94MBs Micro
64GB	29.54 49.91^	64.95 64.95	39.95 29.95
128GB	56.95 99.95^	—	76.00 —
256GB	—	—	—
512GB	^ with USB Reader	—	—

SDXC-UHS1 Speed Class 3 (U3)

	Delkin	Kingston	Lexar	Sandisk	Sony
	633x 90MBs	633x 95MBs	Extreme 60MBs 95MBs	Extm Pro 95MBs	Micro 95MBs
64GB	69.95	49.95	36.95 44.95	59.95 59.45	69.95
128GB	93.50	—	68.95	109.95	—
256GB	175.95	—	127.95	227.95	—
512GB	—	—	—	499.95	—

SDXC-UHS2

	Delkin	Lexar	Sandisk
	U3 280MBs	1000x 1000x 2000x 150MBs Micro 300MBs	Extm Pro 280MBs
64GB	—	44.34 68.95^ 98.34*	129.95
128GB	—	78.69	—
256GB	—	147.59	—
512GB	—	—	—

CFast 2.0 High Speed

High-speed file transfer to meet the demands of broadcast, cinema, and photography.



	Sandisk	Lexar
	Extreme Pro 515 Mbs	510 Mbs
32GB	117.99	128GB.....363.99
128GB	499.95	64GB.....196.69 256GB.....678.99

XQD High-Speed for Nikon D4

	Lexar	Sony
	Professional 1333x	N Series 125MBs G Series 400MBs
32GB	95.95	84.95 139.95
64GB	139.95	169.95 313.95

SDHC Secure Digital High Capacity

	Delkin	Kingston	Sandisk
	Pro Class 10	Micro Class 10 Mobility	Standard Class 4 Micro Class 4
4GB	7.95	—	4.95
8GB	8.95	6.95	5.95
16GB	10.95	9.95	8.95
32GB	15.95	16.95	16.95

FILTERS

TIFFEN 10-Year Warranty Made in USA		Multicoated Filter Technology				
		52mm	58mm	62mm	72mm	77mm
DIGITAL HT FILTERS	812 Warming	65.32	75.37	49.44	54.31	129.95
	Grad ND 0.6	75.37	84.90	110.54	99.99	140.68
	Circular Polarizer	110.54	81.90	105.05	137.23	193.99
	Ultra Clear	43.54	39.90	58.62	44.90	48.90
	Haze 86	28.60	30.38	75.37	44.10	60.00
	ND 1.2	65.32	75.37	99.95	109.95	130.63
	ND 0.6	59.95	35.89	63.15	99.95	80.34
	Soft FX3	75.37	85.41	110.54	120.59	140.68
	Star 4 pt 2	65.32	75.37	100.49	110.54	130.63

Digital Essentials Kits In Stock

Filter Stack Caps 49mm.....	10.95	52mm.....	12.95	55mm.....	10.95	58mm.....	14.95
Filter Stack Caps 62mm.....	13.95	67mm.....	14.95	72mm.....	15.95	77mm.....	16.95

B+W		Buy 3 or more B+W Filters & Get 5% Off					
		52mm	58mm	62mm	67mm	72mm	77mm
UV Haze SC	UV Haze MRC 010M	29.89	32.50	33.63	36.90	49.36	59.75
	Circular Polarizer SC	69.70	62.50	64.50	78.00	63.88	99.95
	Circular Polarizer MRC	64.99	74.89	70.00	89.95	89.95	127.20
	Circular Polarizer Kaesemann MRC	99.90	79.99	99.95	94.95	—	128.99
	Skylight KR1.5 (1A)	24.50	24.50	—	—	42.00	—
	Soft Pro	75.50	94.50	95.00	111.50	135.50	156.50
	Graduated (N.D. & Colors)	109.95	116.50	126.50	119.95	136.95	144.95
	Neutral Density 106	60.00	56.00	82.93	73.98	74.88	99.00
	Close-Up Lenses 1, 2, 3, 4, 5	24.50	24.50	31.95	36.00	42.00	49.00

Filter Wrenches Set of 2 for 48-58mm Filters #GBFW4858.....	4.95
Filter Wrenches Set of 2 for 62-77mm Filters #GBFW6277.....	5.95

HOYA		Buy 3 or more Hoya Filters & Get 10% Off				
		52mm	58mm	67mm	72mm	77mm
Skyline (1B) HMC	UV Haze NXT HMC	23.90	26.85	37.90	44.90	53.90
	Linear Polarizer	15.20	18.26	26.77	32.50	44.90
	Circular Polarizer	29.90	31.90	44.90	50.90	60.90
	Circular Polarizer HMC	49.95	—	49.95	76.95	93.95
	*Moose Warm Circular Polarizer	33.96	37.15	53.90	56.87	68.45
	K2 Yel, X0 Yel/Gm, Gm X1, Or G, Red 25A HMC	20.78	23.99	34.90	31.54	45.66
	Close Up Set (+1, +2, +4)	34.50	49.89	47.62	52.42	50.28
	Close-up Multicoated	34.95	39.90	46.90	64.99	47.95
	Enhancing (Intensifier)	21.99	29.99	44.50	58.21	63.49
	Neutral Density 2x, 4x, 8x HMC	17.85	21.90	30.86	37.09	41.56
Star 6, Star 8		16.50	19.95	31.42	33.94	37.45

cokin		Buy 3 or more Cokin Filters & Get 10% Off			
		"A"	"P"	Z-Pro	
Cokin universal filter holder system allows you to use 1 of 160 different filters on many different-sized lenses. Works with all lenses of SLR cameras (35mm or Digital) and Video/Broadcast cameras. The filter holder is attached to the lens by the adapter ring and takes specially designed round or square filters.	027 Warm 81B	16.99	—	44.99	
	056 Star 8	25.71	32.14	—	
	083/830 Diffuser 1	30.70	—	—	
	120 Grad G1 Grey	24.99	35.00	—	
	121 Grad G2 Grey	32.53	33.44	—	
	122 Grad B1 Blue	32.53	32.00	72.68	
	125 T2 Tobacco	32.53	33.44	72.68	
	153 Grey ND4x	22.07	32.56	53.85	
	164 Circular Polarizer	48.79	110.65	649.90	
	173 VC Blue/Yellow	38.15	78.00	—	
Adapter Rings	"A" 49mm, 52mm, 58mm, 62mm.....	ea. 15.92			
	"P" 52mm, 55mm, 58mm, 62mm, 67mm, 72mm, 77mm, 82mm.....	ea. 19.32			
Universal	"P" Universal.....	50.64			
	Z-Pro 52mm, 55mm, 58mm, 62mm, 72mm, 77mm, 82mm.....	ea. 41.53			

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- SDHC/XC Card Slot
- Full HD 1080 Video at 60 fps

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- Full HD Video at 60fps in MP4 or AVCHD
- 3.0" LCD • SDHC/SDXC Card Slot
- Full HD 1080 Video Recording
- Leica DC Vario-Summilux f/1.7-2.8 Lens
- Built-in Wi-Fi • External Flash Included

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SONY CyberShot DSC-RX10

- Built-In Wireless and NFC Connectivity
- 8.8-73.3mm f/2.8 (35mm equiv: 24-200mm) Carl Zeiss • 3.0" Tilting LCD
- Full HD 1080i/p Video at 60 and 24 fps
- MS Duo/Micro, microSDHC Card Slots
- Super Sonicwave Motor for Fast Autofocus

#SODSCRX10B



SONY CyberShot DSC-RX100 III

- 3.0" Multi-Angle Xtra Fine LCD
- 2.9x Optical Zoom • 11x Digital Zoom
- 8.8-25.7mm f/1.8-2.8 (35mm equiv: 24-70mm) Carl Zeiss Vario-Sonnar T* Lens
- MS Pro Duo/Pro HG-Duo, SDHC/SDXC Card Slot • Full HD Video • Built-In Wi-Fi

#SODSCRX100M3



Tripods with Ball Head

- Detachable Leg and Column Form Monopod • Bubble Level/s
- Non-Rotating Twist-Lock Legs • Grooved center column
- Rubber Feet & Retractable Metal Spikes • Included padded carry bag

Model	Included Ball Head	Load Capacity	Max. Height	Folded	Weight	SKU #	Price
Anodized Aluminum Tripods							
AT-3421	BA-106T	6.6 lb	59"	16.8"	2.7 lb	#OBAT3421106T	\$159.95
AT-3431	BA-108T	8.8 lb	61.3"	17.3"	2.8 lb	#OBAT3431108T	\$199.95
AT-3441	BA-111T	11 lb	63.4"	17.5"	3.5 lb	#OBAT3441111T	\$249.95
AT-3451	BA-113T	13.2 lb	65.5"	18.1"	3.6 lb	#OBAT3451113T	\$289.95
AT-3461	BA-117T	17.6 lb	67.1"	18.9"	4.5 lb	#OBAT3461117T	\$299.95
6x Carbon Fiber Tripods							
CT-3431	BE-108T	8.8 lb	59.5"	17"	2.5 lb	#OBCT3431108T	\$399.95
CT-3451	BE-113T	13.2 lb	61.3"	17.1"	2.5 lb	#OBCT3451113T	\$479.95
CT-3461	BE-117T	17.6 lb	64.5"	17.4"	3.1 lb	#OBCT3461117T	\$479.95
CT-3481	BE-126T	26.4 lb	68"	18.9"	3.8 lb	#OBCT3481126T	\$499.95
CT-3521	BE-106T	8.6 lb	56.4"	14.8"	2.4 lb	#OBCT3521106T	\$379.95
CT-3531	BE-108T	8.8 lb	60.8"	15.5"	2.5 lb	#OBCT3531108T	\$399.95
CT-3551	BE-113T	13.2 lb	62.4"	16"	2.6 lb	#OBCT3551113T	\$469.95
CT-3561	BE-117T	17.6 lb	64.3"	16.8"	3.1 lb	#OBCT3561117T	\$349.95
CT-3581	BE-126T	26.4 lb	67.9"	16.9"	3.9 lb	#OBCT3581126T	\$369.95

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Astral Extreme 2 Monolight Portrait Kit

Kit Includes:

- 2 x Astral Extreme AS-X-400 Monolight
- Luxbanx Small 36" Octagonal Softbox
- Fabric Grid 36" for Luxbanx
- Speed Ring
- 10' Air-Cushioned Light Stand
- Convertible 45" Umbrella - White Satin with Removable Black Backing

#IMASX4002LK.....\$1,189.58

Parabox Speedlight Kit

- 24x36" Parabox Softbox • Umbrella Bracket with Adjustable Shoe
- 10' Light Stand • Adjustable Locking Triple Flash Adapter

#IMPBSB2436K.....\$218.84

VELLO™

BATTERY GRIPS

- Accepts 2 lithium-ion batteries to effectively double the camera's battery life (Batteries not included)
- The included AA battery holder allows you to use 6 AA batteries for added convenience (except BG-N3)
- Alternate shutter release button, main and sub command dials, and an AE-L/AF-L button are provided to facilitate shooting in a vertical orientation

for Canon T5i, T4i, T3i, T2i	BG-C5.2	#VEBGC52.....	\$67.95
for Canon T5, T3	BG-C7	#VEBGC7.....	\$59.95
for Canon 6D	BG-C8	#VEBGC8.....	\$74.95
for Canon 5D Mark III	BG-C9	#VEBGC9.....	\$99.95
for Canon 70D	BG-C10	#VEBGC10.....	\$84.95
for Nikon D5200, D5100	BG-N6	#VEBGN6.....	\$59.95
for Nikon D800, D800E	BG-N7	#VEBGN7.....	\$89.95
for Nikon D3100, D3200	BG-N9	#VEBGN9.....	\$64.95
for Nikon D600, D610	BG-N10	#VEBGN10.....	\$79.95
for Nikon D7100, D7200	BG-N11	#VEBGN11.....	\$89.95
for Nikon D750	BG-N15	#VEBGN15.....	\$89.95

PHOTOGRAPHY ACCESSORIES

BATTERIES

(Cont'd from page 69)

Note: “Battery packs,” “modules” or “battery assemblies” are treated as batteries.

- A cell is a single encased electrochemical unit. It has one positive and one negative electrode that exhibit a voltage differential across its two terminals.

Note: Many cells can be termed a “battery” or “single-cell battery” in common conversation, but a single cell must use the requirements related to “cells” only. Examples of a “cell” would be a CR123 primary lithium cell used for cameras and flashlights.¹

¹Source: “IATA Lithium Battery Guidance Document: Transport of Lithium Metal and Lithium Ion Batteries,” IATA, 2014, Web. www.iata.org/lithiumbatteries

TSA And Airline Requirements

Airlines within the U.S. allow passengers to carry on and check batteries with exceptions, and these exceptions are within reason. Quoting directly from the FAA, as of February, 2015, what *can* accompany you:

Carry-On Baggage:

1 Lithium-ion batteries (aka rechargeable lithium, lithium polymer, LiPo, secondary lithium). Passengers may carry all consumer-sized lithium-ion batteries (up to 100 watt-hours per battery). This size covers AA, AAA, cell phone, PDA, camera, camcorder, handheld game, tablet, portable drill and standard laptop computer batteries. *External chargers are also considered to be a battery.* Passengers can also bring two larger lithium-ion batteries (100 to 160 watt-hours per battery) in their carry-on.

2 Lithium-metal batteries (aka non-rechargeable lithium, primary lithium). These batteries are often used with cameras and other small personal electronics. Consumer-sized batteries (up to 2 grams of lithium per battery) may be carried. This includes all the typical non-rechargeable lithium batteries used in cameras (AA, AAA, 123, CR123A, CR1, CR2, CRV3, CR22, 2CR5, etc.), as well as the flat, round lithium button cells.

Checked Baggage:

Except for spare (uninstalled) lithium-metal and lithium-ion batteries, all the batteries allowed in carry-on baggage

Categorical Size	Cells		Batteries		Watt-hours
	Non-Rechargeable	Rechargeable	Non-Rechargeable	Rechargeable	
Small (no more than)	1.0 g Li	1.5 g ELC	2.0 g Li	8 g ELC	up to 100 Wh
Medium (between)	1.0 g / 5 g Li	1.5 g / 5 g ELC	2.0 g / 25 g Li	8 g / 25 g ELC	100 - 300 Wh
Large (more than)	5 g Li	5 g ELC	25 g Li	25 g ELC	more than 300 Wh

are also allowed in checked baggage. The batteries must be protected from damage and short circuit or installed in a device. Battery-powered devices—particularly those with moving parts or those that could heat up—must be protected from accidental activation. *Spare lithium-metal and lithium-ion/polymer batteries are prohibited in checked baggage—this includes external chargers.*

This means that as long as the battery is physically seated in the device, there should be no problems transporting batteries. The whole reason (and the aforementioned exception) is the majority of persons traveling don't properly protect the battery from having a short circuit.

When metal objects such as keys, coins, tools or other batteries come in contact with both terminals of a battery, it can create a “circuit” or path for electricity to flow through. Electrical current flowing through this unprotected short circuit can cause extreme heat and spark, and even start a fire. To prevent short circuits, keep spare batteries in their original packaging, a battery case, or a separate pouch or pocket. Make sure loose batteries can't move around. Placing tape over the terminals of unpackaged batteries also helps to insulate them from short circuit.

There's no limit on the number of most consumer-sized batteries or battery-powered devices that a passenger can carry for personal use, yet the larger lithium-ion batteries are limited to two batteries per passenger.

Shipping

Whether traveling with or shipping your batteries, photo equipment or whatever, carriers are governed by the rules set by the International Air Transport Association (IATA), which are based on the rules set by the International Civil Aviation Organization (ICAO). The ICAO is the UN body that has jurisdic-

tion over international aviation rules.

Within the U.S. and its territories, in accordance with the previous organizations, the Pipeline and Hazardous Materials Safety Administration of the U.S. Department of Transportation (PHMSA) develops regulations for transport of dangerous goods by all modes within the U.S.

Two of the more frequently used carriers in the U.S. are Federal Express (FedEx) and United Parcel Service (UPS). Both have links on their websites to information for regulations and instructions regarding transporting lithium-metal and lithium-ion batteries. They're virtually identical in their rules/regulations, but explain those rules in two entirely different manners.

These carriers are very specific regarding the categorical size and the lithium content of the batteries, which, in turn, will determine if the batteries will be shipped via ground or air, or by special cargo conforming to the U.S. DOT Hazardous Materials Regulations. The Hazardous Materials Information Center can be reached at (800) 467-4922.

Summary

In general, use common sense when packing for travel. Be aware that lithium batteries can pack a tremendous punch of power and can short out if not properly stored or packaged. Know the capacity and specifications of your battery and which rules govern its transport. It may be a good idea to keep an electronic copy of the rules and regulations as mandated by law; if there are any questions at the airport, you'll have some backup to allow you to carry on or check your baggage. **OR**

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"We've Got You Covered"

LensCoat makes unique, protective covers for camera lenses, bodies, and accessories. Made from 100% closed-cell neoprene, LensCoat products protect your gear from bumps and scratches, they keep rain and mist away from sensitive equipment, and they also insulate your hands from cold equipment.

Lens Covers

- Available with a custom fit for most popular lenses
- Clear, flexible window over the AF/IS/VR controls and the distance-scale window.
- Custom holes that reveal the red-dot for easy alignment to the camera body without removing the cover.
- Also available in white for Canon lenses



Hoodie Lens Caps

- Fits snugly around your lens hood or shade
- Features a reinforced removable front protection disc
- Available in 9 colors



3-Small	2.75" to 3.25"	2X-Large	5.5" to 6.25"
Small	3.25" to 3.75"	3X-Large	6.25" to 7"
Medium	3.75" to 4.25"	4X-Large	7" to 7.75"
Large	4.25" to 4.75"		
3-Large	4.75" to 5.25"		

Battery Pouches

- Consists of 2 Pouches
- Pouches Snap Together
- 7 different colors/patterns
- Belt Hoop
- 4 Models: AA4+4, DSLR 1+1, DSLR 2+2 or Pro DSLR 1+1



LegCoat Wraps (part of 3)

- Wrap around the upper leg of your tripod
- Tightly grips to your tripod so they will not slide



Xpandable Series — Long Lens Bags

This is one smart bag. Whether you're in the field or a safari vehicle it's perfect when you want to be ready to take the shot at a moment's notice. The Xpandable bag can be ingeniously folded to three different sizes — or folded flat!

- Removable lid with pocket zips on easily & securely at all three positions
- Male and female ends on removable shoulder strap allow for strap to be used to secure bag
- Removable reinforced insert panels allow you to configure the weight and support
- Expandable exterior mesh pocket
- Removable harness (sold separately)
- Multiple connection points to secure the bag
- Built to last with heavy-duty water-resistant Cordura and lightweight, water-resistant nylon lining
- MOLLE webbing system to easily add pouches & accessories
- Available in Black, Digital Camo, Forest Green Camo, or Realtree Max1
- Made in the USA



NEW

3Kpandable Internal dimensions 8" x 8" x 19.75" or 23.5" or 27.75"

Accommodates camera body with lenses such as Canon 200-400mm, 300mm F2.8, 400mm G2, 600mm, Nikon 200-400mm, 300 F2.8, 600mm, Sigma 600mm, 700-400mm, Sony 600mm

4Kpandable Internal dimensions 9" x 9" x 21.5" or 24.5" or 28.75"

Accommodates camera body with lenses such as Canon 500mm, 400mm F2.8, 600mm, 800mm, 900mm

Memory Wallets

- Lightweight waterproof
- Easy clip on fanny
- 7 different colors/patterns
- 6 designs: CFB10, SD9/H5, Combo 43/66



RainCoat 2

The LensCoat® RainCoat 2 has all same great features as the original RainCoat but adds an additional integrated pocket with foldaway arm sleeve on the left side.

Pro 30.5" 11.6oz

(Folded version for 600mm & 800mm 9" x 2.4oz)

Standard 20.5" 9.4oz



NEW

Other Innovations from LensCoat®

- Gimbal Pouch • CB Gimbal Pouch • Manfrotto 303 Gimbal Pouch
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- TravelCoat • LensPouches • FlashKeeper • iPad Sleeve • LegCoat Wraps

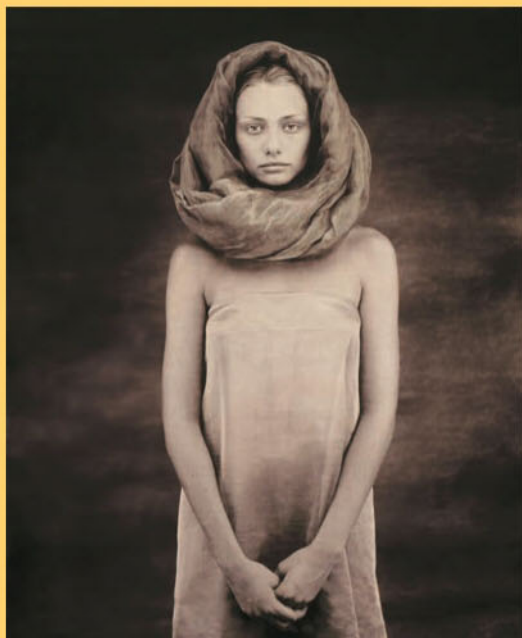


Mud Bath

Photography can be a dirty job, as London-based photographer David Lloyd found out on a recent shoot in Maasai Mara, Kenya. "A whole pride of lions blackened themselves for the sake of a buffalo, taken down in a filthy waterhole," he explains of his image "Big Cat Mud Bath." The photo was a bit of a challenge

to capture, he says, with other lions, grass and, of course, mud in the way, but the end result was worth the wait. "Later in the day," he recalls, "the lions were startlingly clean, having spent most of the day cleaning themselves free of all the mud." To see more of David Lloyd's work, visit davidlloyd.net.

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X-T1



Photo © 2015 Jonathan Irish | FUJIFILM X-T1 Camera and XF10-24mm F4 R OIS lens, at 1/15 sec at F5.6, ISO 400.

Inspiring places can fuel a **Passion...**



"I absolutely love the FUJIFILM X-T1. As an adventure and travel photographer, the compact size is really important to me. However, what really stands out is the excellent image quality, which is on par (even better than!) my big, heavy DSLR's and the image quality has blown me away".

-Jonathan Irish



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